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29 October 1976

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ENGINEERING AND EQUIPMENT

No. 25

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CONTENTS	PAGE
ENGINEERING	
Acoustics and Ultrasonic.....	1
Aeronautical and Space.....	6
Construction.....	28
Heat, Combustion, Detonation.....	32
Hydraulic and Pneumatic.....	34
Industrial.....	38
Materials.....	49
Metrology.....	59
Stress Analysis and Stability Studies.....	72
Turbine and Engine Design.....	83
EQUIPMENT	
Gyroscopic.....	92
Measuring, Testing.....	95
Power - Engine - Turbine - Pump.....	119

ENGINEERING
Acoustics and Ultrasonic

USSR

UDC 539.3:534.231.1

CHABANOV, V. E., SHCHEV'EV, Yu.P., and L. Ya. DUBOVNIK, B. E., Bedeneyev All-Union Scientific-Research Institute of Hydro Engineering, Leningrad

DIFFRACTION OF SOUND AT A LARGE CYLINDRICAL CAVITY INSIDE AN ELASTIC MEDIUM

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 3, Mar 76 pp 14-20 manuscript received 3 Jun 74

[Abstract] In order to evaluate the reflective characteristics of certain defects in a material, it is necessary to consider the problem of diffraction at a cylindrical cavity. Some methods of solving this problem become very unwieldy, when applied to such a cavity of large wave dimensions, even with the aid of a digital computer. In the simpler Watson method, the series representing the potential of cylindrical waves is transformed to an integral in the complex plane and evaluated as the sum of residues. A difficulty in this method, which so far has been applied to perfectly diffracting bodies, is locating the poles of the integrand Bessel and Hankel functions (of the first kind). This can be facilitated by replacing these functions by asymptotic Debye representations, as is shown in the case of a plane acoustic wave impinging on a large cylinder in the direction normal to the generatrix of the latter. Figures 4; references 3: 2 Russian, 1 Western.

1/1

USSR

UDC 531.717.082.4:534-8:621.9.08

VOLOSNIKOV, F. K., RODCHENKO, V. A.

SOME PARAMETERS OF ULTRASONIC PICKUPS IN COOLANT SPRAY JETS

TRUDY ALTAYSKOGO POLITEKHNICHESKOGO INSTITUTA [Works of Altay Polytechnical Institute] in Russian No 42, 1975 pp 45-48

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.260 by P. N. A.]

[Text] When ultrasound is used for active monitoring on metal-cutting machine tools with liquid coolants, it becomes necessary to raise the pickups to a certain height H . An examination is made of the conditions that influence the height H . The most important conditions are the diameter of the coolant jet, and assurance of a laminar jet of coolant through which the ultrasound travels to the workpiece and is picked up after reflection. An examination is made of methods of ensuring conditions for minimum H . The pickups were tested on circular grinders, and provided active monitoring with accuracy meeting technical specifications. Reference 1.

1/1

USSR

UDC 681.7:534.8:535.42

KULAKOV, S. V., and SOROKA, V. V.

ON THE FEASIBILITY OF USING ANISOTROPIC DIFFRACTION OF LIGHT TO IMPROVE THE
PARAMETERS OF ACOUSTICO-OPTICAL SIGNAL PROCESSING DEVICES

Kiev VTORAYA VSESOYUZNAYA KONFERENTSIYA PO GOLOGRAFIY. TEZISY DOKLADOV.
CHAST' PERVAYA [Second All-Union Conference on Holography. Abstracts of the
Papers. Part I] in Russian, 1975 pp 42-43

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976
Abstract No 2.32.1354]

[Text] A method is proposed for approximate calculation of relations in any
uniaxial crystals in the acoustic wave frequency region where one of the
angles remains practically fixed and the other depends on frequency. It is
shown by exact computer calculations that the technique gives a good approxi-
mation for practically all presently known uniaxial crystals.

1/1

USSR

UDC 681

KARPOV, L. P., KULIKOV, V. V. and CHERNOV, B. K.

USING AN ULTRASONIC LIGHT MODULATOR IN A CORRELATOR OF HETERODYNE TYPE

Kiev VTORAYA VSESOYUZNAYA KONFERENTSIYA PO GOLOGRAFIY. TEZISY DOKLADOV.
CHAST' PERVAYA [Second All-Union Conference on Holography. Abstracts of the
Papers. Part I] in Russian, 1975 pp 20-21

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976
Abstract No 2.32.1470]

[Text] A theoretical and experimental study was done on the operation of an
ultrasonic light modulator in a correlator of heterodyne type. A comparative
analysis is made of the operation of a correlator of conventional design and
one in which the analyzing element is an ultrasonic modulator excited by an
LFM-signal. Reference 1.

1/1

USSR

UDC 620.179.1-192

POVELITSYN, G. YE.

ON THE PROBLEM OF IMPROVING RELIABILITY OF QUALITY CONTROL OF WELDS

IZVESTIYA TOMSKOGO POLITEKHNICHESKOGO INSTITUTA [Bulletin of Tomsk Polytechnical Institute] in Russian Vol 280, 1975 pp 109-110

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.190]

[Text] An examination is made of questions of complex quality control of welded structures, and it is shown that it is not sufficient to use a single method of nondestructive inspection for determining the quality of welds. The resultant experimental data show the necessity for combined radiographic and ultrasonic methods of checking the quality of welded seams in closed structures of 30KhGSA and 30 KhGSNA steel. The introduction of complex inspection improves the probability of flaw detection in items being checked.

1/1

USSR

UDC 534.6.088(088.8)

ABRAMOV, G. V. and PROKUDIN, V. V., Kuybyshev Aviation Institute

A METHOD OF DETERMINING THE PARAMETERS OF AN ULTRASONIC FIELD

USSR AUTHOR'S CERTIFICATE No 454472, division G, filed 6 Feb 73, published 11 Mar 75

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.616P]

[Text] A method is proposed for determining the parameters of an ultrasonic field set up by an acoustic system. The technique is based on emission, reception and comparison of received signals with a reference signal. To improve accuracy and reduce the time needed for making measurements, an acoustic line grating is stimulated by a short ultrasonic pulse traveling lengthwise of the grating, and the signals from each element of the grating are picked up sequentially in a time equal to that of pulse travel along the grating with subsequent determination of the distribution of amplitude and phase of ultrasonic waves from the received signals.

1/1

USSR

UDC 620.179.15/.16.088

VOLCHENKO, V. N. and LUPACHEV, V. G.

COMPARISON OF THE FLAW-DETECTING CAPABILITIES OF ULTRASONIC AND RADIOGRAPHIC INSPECTION OF BUTT WELDS 30-40 mm THICK

Moscow KOMPLEKSNAYA DEFEKTOSKOPIYA SVARNYKH I PAYANNYKH SOYEDINENIY [Complex Flaw Detection of Welds and Soldered Joints, Collection of Works] in Russian, 1975 pp 73-77

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.212 by P. N. A.]

[Text] An evaluation is made of the comparative detectability of flaws by the results of radiographic and ultrasonic inspection, using a unified criterion and procedure. Statistical analysis is based on plant data on 139 sections of butt-welded seams made by manual arc welding. In ultrasonic flaw detection the sizes of defects were determined by measuring their normalized extent and height. In radiographic inspection the extent of defects was determined from the dimensions of the defects on the x-ray film, while the height was determined by photometric measurement. The data show that ultrasonic inspection is better than radiography in showing up the most dangerous flaws of flat shape. References 5.

1/1

USSR

UDC 620.179.15/.16:621.791.5

YABLONIK, L. M., SHCHUKIN, V. A., ZASLAVSKIY, F. YA. and RYL'SKAYA, N. V.

DETECTABILITY OF NATURAL FLAWS IN WELDED SEAMS BY RADIOGRAPHIC AND ULTRASONIC METHODS

Moscow KOMPLEKSNAYA DEFEKTOSKOPIYA SVARNYKH I PAYANNYKH SOYEDINENIY [Complex Flaw Detection of Welds and Soldered Joints, Collection of Works] in Russian, 1975 pp 68-72

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.192 by P. N. A.]

[Text] The paper presents the results of an experimental study of natural flaws in welded joints of steel structural elements made with low-alloy welding materials by manual and electric-arc techniques from 6 to 20 mm thick. Flaw detection was done by radiography on the RUP-300 instrument with sensitivity of the order of 1-2%, and by the ultrasonic method using prismatic probes with input angle of 52-54° on a frequency of 5 MHz. Tables 3.

1/1

USSR

UDC 536.46

MAKSIMOV, YU. YA., ABRUKOV, S. A. and KACHUSHKIN, V. I.

INFLUENCE OF AN ELECTRIC FIELD ON A SINGING FLAME AT DIFFERENT RATES OF
AIRFLOW IN THE TUBE

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [Combustion Physics
and Ways to Study it, Collection of Works] in Russian No 4, 1975 pp 103-106

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 1, 1976
Abstract No 1.34.21 (résumé)]

[Text] The paper gives the results of an experimental study of the influence
of an electric field on excitation and suppression of acoustic oscillations
in a resonator tube at different rates of airflow. It is shown that the
region of excitation and quenching of a singing flame decreases with
increasing rate of airflow in the resonator tube. Figures 2, references 8.

1/1

USSR

UDC 629.78.015.532.526

BAGAYEV, G. I., LEBIGA, V. A., and KHARITONOV, A. M. In: Sbornik "Simposium po
fiziki akusticheskikh-gidrodinamicheskikh yavleniy" [Proc Symp on the Physics of
Acoustic-Hydrodynamic Phenomena], Sukhumi, 1975. Moscow, "Nauka," 1975, pp 276-281

RADIATION OF SOUND BY A SUPERSONIC TURBULENT BOUNDARY LAYER

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.82 by
A.V.U.]

[Abstract] Results are presented which were obtained within the framework of a
research program on the effect of perturbations of an oncoming flow on the transi-
tion of a laminar boundary layer into a turbulent one, using a flat plate model in
a supersonic stream. The investigations were carried out at Mach numbers $M=2,3$,
and 4 and Reynolds numbers $Re_M = (5 - 70) \times 10^6 m^{-1}$. The characteristics of the
radiation were measured for supersonic speeds by d-c thermo-anemometers that had
a frequency range of up to 200 kHz and with the aid of a 1/8" capacitor micro-
phone. Data analysis revealed the dependence of the change in pressure pulsa-
tions and boundary layer thickness. The direction of radiation is determined by
the speed of motion of the pulsation sources and depends only on the Mach number.
Results are compared with data obtained by other authors. Figures 5; references
6.

AVU 3060

1/1

USSR

UDC 629.78.076.6

EISMONT, N. A.

USE OF HARMONIC APPROXIMATION FOR PROCESSING THE MEASUREMENTS IN A DETERMINATION OF THE ORIENTATION OF SPACE VEHICLES

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 37-43

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.70]

[Text] An algorithm is described for measurements taken with optical sensors used in determining the orientation of a rotation-stabilized space vehicle. The algorithm is based on a determination of parameters of an harmonic approximation of the law of motion of a space vehicle around a center of mass. These parameters are constant for fixed time intervals. Ill 3

1/1

USSR

UDC 629.78.076.6

GORDEYEVA, YU. F.

ACCOUNTING FOR THE INFLUENCE OF CONCENTRATED MASSES IN THE SEMI-ANALYTICAL METHOD OF COMPUTING THE MOTION OF ARTIFICIAL LUNAR SATELLITES

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 43-73

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2 76 Abstract No 2.41.71]

[Text] A numerical algorithm is given to account for the influence of concentrated masses in the semi-analytical method of computing the motion of lunar satellites. A special variation of the canonical transforms of a Hamiltonian system of equations is used to obtain the algorithm. The algorithm is derived, and an estimate is made of the accuracy and speed of the method for various lunar orbits. Ill 2 Tab 7 Bibl 7

1/1

USSR

UDC 629.78.076.6

LIDOV, M. L. and NEYSHTADT, A. I.

METHOD OF CANONICAL TRANSFORMS IN PROBLEMS OF THE ROTATION OF CELESTIAL BODIES AND THE LAW OF CASSINI

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 74-106

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.72]

[Text] The authors consider the problem of the rotation of a celestial body that dynamically approximates a sphere. The rotation of the body is perturbed by gravitational moments from a point that moves along an evolutionizing orbit. Canonical variables are derived that are analogous to the second system of canonical elements of Poincaré. Secular equations of rotation are obtained for the case of 1:1 resonance. Steady state solutions of the secular equations are obtained and studied. Attention is paid to the contradiction between the

1/2

USSR

LIDOV, M. L. and NEYSHTADT, A. I., OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV, 1975 pp 74-106

data on lunar parameters obtained from observations and the data on the lunar gravitational field obtained from the evolutionizing of the orbits of the lunar satellites. Ill 3 Tab 1 Bibl 20

2/2

USSR

UDC 629.78.076.6

PIVOVAROV, M. L.

ON THE SECULAR AND PERIODIC PORTION OF PRECESSION IN THE EULER-PUANSO PROBLEM

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 107-110

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.73]

[Text] In a consideration of the classical formula for the precession angle in the Euler-Puanso problem it is shown that the analysis of this expression for the purpose of separating the secular and periodic components, as is done in a number of works, is incorrect. A solution of this problem is given. The results can be used in a determination of the orientation of space vehicles. Ill 2 Bibl 4

1/1

USSR

UDC 629.78.076.6

BAKSHSIYAN, B. TS., KUZ'MINYKH, V. A. and SUKHANOV, A. A.

OPTIMUM ESTIMATE OF THE SUMMATION PULSE FOR CORRECTING THE TRAJECTORY OF A SPACE VEHICLE

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 111-115

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.74]

[Text] The authors consider the problem of determining the optimum estimate of the summation pulse for a linear correction of an orbit in the ideal case. The errors in the determination of the trajectory as well as the errors in the use of the correction are taken into account. An algorithm for a numerical solution of the problem is given for the case of 2-pulse, 2-parameter correction. Results are given of calculations of trajectory corrections for a flight to Jupiter. Bibl 10

1/1

USSR

UDC 629.78.076.6

MERSOV, G. A.

SOLAR SATELLITE TRAJECTORY FOR RADIOSOUNDING OF SPACE NEAR THE SUN

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 115-122

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.75]

[Text] A heliocentric orbit is considered that is symmetrical with respect to the orbit of the earth around the sun, the so-called counterearth orbit. As the sonde moves on the counterearth orbit the sun, earth, and sonde will continuously be on one straight line. Methods for execution are presented. The perturbation of the sonde is considered, and requirements are determined for the accuracy of execution for the case of limited secular perturbations. Ill 4 Tab 1 Bibl 3

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USSR

UDC 629.78.076.6

MAZO, V. L.

MIXED PARAMETERS IN A LINEAR REGRESSION SCHEME

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 123-130

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.76]

[Text] A scheme of linear regression with mixed parameters is considered for the problem of estimating the accuracy of a determination of the trajectory of a space vehicle. A geometric interpretation is offered for undistorted estimates. The equivalence of a set of undistorted (unbiased) estimates and a set of least square estimates is demonstrated, and the estimates with minimum covariance are found within these sets. Bibl 3

1/1

USSR

UDC 629.78.076.6

SUKHANIV, K. G.

METHOD OF PLOTTING FIELDS OF ISOLINES FOR TRAJECTORIES WITH GRAVITATIONAL FLIGHT AROUND A PLANET

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 147-154

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.79]

[Text] The author considers the problems involved in the study of interplanetary trajectories with gravitational flights around a planet. General and linearized equations are derived for the gravitational fly-around. For plotting the isolines the author proposes a method of direct motion along lines of level. The method of plotting is generalized for a space of arbitrary dimensions and applied to the analysis of the trajectories. Bibl 6

1/1

USSR

UDC 629.78.076.6

KHEYFETS, V. N.

GUIDING A SPACE VEHICLE IN A FLIGHT AROUND A PLANET

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 154-163

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.80]

[Text] The author considers the problem of the optimum control of the motion of a space vehicle in the vicinity of an intermediate planet on the basis of autonomous optical and ground-based doppler measurements. It is assumed that ground-based equipment is used to guide the vehicle over the entire approach flight to the vicinity of the intermediate planet. Analytical expressions are obtained for the optimum number of corrections. Ill 4 Bibl 1

1/1

USSR

UDC 629.78.076.6

KOGAN, A. YU.

SELECTION OF THE ANTICIPATED ORBIT IN THE CASE OF FLIGHTS FROM EARTH TO A
PLANET AND RETURN

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of
Space Vehicles, Collection of Articles) in Russian 1975 pp 163-168

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.81]

[Text] The problem is considered of selecting the optimum anticipated orbit
in the case of a given approach time to a planet and launch time from the
anticipated orbit. It is assumed that the anticipated orbit becomes evolute
under the effect of the polar compression of the planet. It is shown that
among the 3-impulse interorbital transitions the biparabolic transitions
with rotation of the plane during the second impulse are optimum. Equations
are derived for the elements of the optimum anticipated orbits for the case
where both transitions are biparabolic. Ill 3 Bibl 2

1/1

USSR

UDC 629.78.076.6

BUSHUYEV, YE. I., VASIL'YEVA, A. I., KAMENKO, V. F., KOVTUNENKO, V. M.,
KRASOVSKIY, A. A., and MASHTAK, V. YA.

STUDY OF THE DENSITY OF THE UPPER ATMOSPHERE AND AERODYNAMICS OF SATELLITES
ON THE BASIS OF DATA ON THE EVOLUTIONIZING OF ORBITS

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of
Space Vehicles, Collection of Articles) in Russian 1975 pp 168-182

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.82]

[Text] The authors devised a method of computing the evolution of the param-
eters of orbits for estimating the drag of artificial earth satellites that is
based on experimental data. The intrinsic errors of the method do not exceed
6%. By evolutionizing the orbital parameters of a space vehicle for CIRA-65
about 3,100 measurements of the orbits of the "Kosmos" series were processed
in the period 1962-72. The general results of a statistical processing are
given. Procedures for maximum refinement of the models of upper atmosphere
density are designated. Tab 6 Bibl 21

1/1

USSR

UDC 629.78.076.6

BUSHYEV, YE. I., VASIL'YEVA, A. I., YEGORTSEV, YE. YA., KRASOVSKIY, A. A.,
and MASHTAK, V. YA.

STATISTICAL EVALUATION OF EXPERIMENTAL DATA ON THE DECELERATION OF ARTIFICIAL
EARTH SATELLITES

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of
Space Vehicles, Collection of Articles) in Russian 1975 pp 182-198

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.83]

[Text] A statistical evaluation was made of 3,100 random realizations of the
function $C_x(X)$. The mathematical expectation of the aerodynamic drag for
various types of earth satellites was in satisfactory agreement with the cor-
responding theoretical values. The maximum error in the determination of the
deceleration of an artificial earth satellite in the interval of 1-6 days
amounted to 60% when the CIRA-65 model was used. By means of the group method
of computing arguments, hierarchical functions $C_x(X)$ are obtained, which
afford the possibility of reducing the drag determination error from 60% to
29-44%. Ill 5 Tab 9 Bibl 6

1/1

USSR

UDC 629.783.017.2

ROMASHEVA, L. N., KUZNETSOV, L. I.

ON THE QUESTION OF THE OSCILLATIONS OF A MAGNETIZED SATELLITE

Leningrad PRIKLADNAYA MEKHANIKA (Applied Mechanics, Collection of Articles)
in Russian No 2, 1975 pp 43-47

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.85]

[Text] With the hysteresis losses in a ferromagnetic rod taken into account,
the authors consider the plane oscillations of a magnetized satellite moving
around the earth on a circular equatorial orbit near the field intensity vector
of the geomagnetic field. The third hypothesis of Korchinskiy is used for the
analytical representation of the hysteresis loop. An approximate solution of
the problem is obtained by the method of averages for the case of oscillations
with initial amplitude of the order of 90 degrees. Ill 1 Bibl 3

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USSR

UDC 629.783.017.2

KUZNETSOV, L. I., NEROVNAYA, V. S.

PLANE MOTION OF A SATELLITE WITH A TOROIDAL CAVITY FILLED WITH A VISCOUS INCOMPRESSIBLE FLUID

Leningrad PRIK. MEKHANIKA (Applied Mechanics, Collection of Articles) in Russian No 2, 1975 pp 55-61

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.86]

[Text] In a treatment of the problem of the plane oscillations of an artificial earth satellite with toroidal cavity filled with a viscous fluid, an approximation method is used to obtain formulas that can be used to determine the damping rate of the oscillations. Bibl 2

1/1

USSR

UDC 629.783.017.2

KATAYEV, S. P.

ON THE PROBLEM OF STABILIZING A SATELLITE WITH A FLYWHEEL

Leningrad PRIKL. MEKHANIKA (Applied Mechanics, Collection of Articles) in Russian No 2, 1975 pp 62-67

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.87]

[Text] The problem involves the stabilization of an artificial earth satellite by flywheel in the direction lying in the plane of the orbit along which the center of mass of the satellite is moving. A rule is established for controlling the voltage fed to the flywheel motor terminals with the process in the electrical circuit of the flywheel armature taken into account. An asymptotic stability of the stabilized state of the satellite is demonstrated by direct integration of the equations of motion for the obtained control condition. Bibl 2

1/1

USSR

UDC 629.78.017.2

CHERNYAVSKIY, P. M.

ACCOUNTING FOR THE NONLINEARITY OF THE AERODYNAMIC CHARACTERISTICS IN THE ROLLING MOTION OF AN AXISYMMETRICAL FLIGHT CRAFT

Moscow UCH. ZAP. TSENTR. AERO-GIDRODINAM. IN-TA (Scientific Notes of the Central Aerohydrodynamic Institute) in Russian No 4, 75 pp 112-116

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.90]

[Text] A study is made of the peculiarities of the rolling motion under the effect of two roll moments, a constant rolling moment M_0 and a rolling moment M_{k0} which are caused by a slight asymmetry and a rolling moment generated by transverse blowing. In a linear approximation that rolling motion is considered which is in the vicinity of specific points, and a qualitative analysis is provided with the nonlinearity of the aerodynamic characteristics taken into account. It is shown that for M_0 M_{k0} a periodic rolling motion is possible if the value of the natural damping of the flight craft in roll is below a certain critical level. Approximate and precise relationships are obtained

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USSR

CHERNYAVSKIY, P. M., UCH. ZAP. TSENTR. AERO-GIDRODINAM. IN-TA, No 4, 75 pp 112-116

for the bifurcated damping values and constant components of the rolling moment. A qualitative picture of the behavior of the system on a phase plane is acquired, and certain parameters of the periodic roll rotation are determined. Ill 5 Bibl 4

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USSR

UDC 629.78.076.6

GONIN, G. B.

ORBITAL MOTION OF A SPACE CRAFT

Leningrad KOSMICH. FOTOS'YEMKA I GEOL. ISSLED. (Space Photography and Geological Research, Collection of Articles) in Russian 1975 pp 52-63

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.91 by T. A. E.]

[Text] The laws of the orbital motion of a space craft are considered from the point of view of their influence on space photography. A classification of orbits is given, and the influence of the displacement of the space craft on the smearing of the image is demonstrated. Ill 5 Tab 3

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USSR

UDC 629.78.017.2

KUZNETSOV, L. I.

BENDING OSCILLATIONS OF AN ANTENNA IN THE SATELLITE ROTATION MODE

Leningrad PRIKL. MEKHANIKA (Applied Mechanics, Collection of Articles) in Russian No 2, 75 pp 47-55

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 1.41.93]

[Text] The oscillations of an antenna caused by the rotational motion of the satellite are considered. A method of reduction is used to study the motion originally. Then a method of solution refinement is used for the nonresonant case, and formulas are derived with which a precise determination can be made of the mean deviation from the equilibrium position. Ill 1 Bibl 3

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USSR

UDC 629.78.017.2

NO AUTHORS GIVEN

METHODS OF PARAMETRIC IDENTIFICATION OF LINEAR MODELS AND THE FEASIBILITY OF THEIR USE ALGORITHMS FOR SPACE CRAFT CONTROL

Moscow KOSMICH. APPARATY (Space Craft, Collection of Articles) in Russian 1975 pp 122-149

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.94 by E. R. S.]

[Text] A survey is made of the theoretical results that are the basis for deriving recurrent algorithms for a parametric identification of linear dynamic systems, and assessments and a comparison are made of the algorithms from the point of view of the possibility of their future use. These analyzed algorithms, that are used in adaptive systems of space craft control, must guarantee a determination of the changing parameters of a space craft during flight and execute the corresponding parametric adjustment of the control system. An approach to the problem of the identification of linear discrete dynamic

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USSR

KOSMICH. APPARATY 1975, pp 122-149

models of a space craft is proposed that is based on parametric methods of determining the coefficients of the corresponding linearized equations of motion of the space craft. This method (unlike methods involving a determination of the impulse transfer function) simplifies the calculations and offers the possibility of direct use of the obtained determinations in the adaptive law of control. Bibl 27

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USSR

UDC 629.78.076.6

POYUROVSKIY, V. D. and ROZENFEL'DT, A. L.

SELECTING OPTIMAL MEASUREMENT PROGRAMS FOR CONTROLLING SPACE VEHICLE ORBITS
BY RADIO

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of
Space Vehicles, Collection of Articles) in Russian 1975 pp 141-147

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.78]

[Text] The problem considered is that of selecting the minimum number of
radio measurement devices that will guarantee a given accuracy of determina-
tion and prediction of the orbital parameters of a space vehicle. The solu-
tion of the problem takes into account the statistical characteristics of the
accuracy and reliability of the measuring devices and the errors of the model
of the perturbation effects of the atmosphere and gravitational field. The
selection of a rational scheme is realized by the use of a directed sorting

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USSR

POYUROVSKIY, V. D. and ROZENFEL'DT, A. L., OPREDELENIYE DVIZHENIYA KOSMICH.
APPARATOV, 1975 pp 141-147

in which the physical peculiarities and limitations of the problem are used
for the purpose of reducing the number of variants considered. Bibl 12

2/2

USSR

UDC 629.78.015.3:533.6.011.5

LASHKOV, YU.A. and SOKOLOVA, I. N.

EXPERIMENTAL STUDY OF THE INFLUENCE OF NEEDLES ON THE DRAG OF
A ROTATING BODY

Moscow UCH. ZAP TSENTR. AERO-GIDRODINAM. IN-TA (Scientific Notes
of the Central Aerohydrodynamic Institute) in Russian Vol 6,
No 4, 1975, pp 93-94

/From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76
Abstract No 2.41.104/

/Text/ Results are given of an experimental study of the
influence of short protruding needles on the drag of a rotating
at M 2.25. It is shown that with the needles present a body
of rotation with optimum bluntness has the lowest value c_{x0}
in comparison with other bodies of rotation.

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USSR

UDC 629.78.015.3:533.6

KOLGAN, V. P.

PRECISE SOLUTION OF THE PROBLEM OF THREE-DIMENSIONAL INTERACTION
OF A SHOCK WAVE WITH A MOVING WEDGE

Moscow UCH. ZAP TSENTR. AERO-GIDRODINAM. IN-TA (Scientific Notes
of the Central Aerohydrodynamic Institute) in Russian Vol 6
No 4, 75, pp 67-70

/From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76
Abstract No 2.41.105/

/Text/ A new class of precise solutions is considered for the
problem of the three-dimensional interaction of a shock wave
and moving wedge. Values are derived for the parameters of the
determined class of solutions. Ill 4 Bibl 3

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USSR

UDC 629.78.015.3: 533.6.011.5

BOGOLEPOV, V.V.

SUPERSONIC FLOW OF A VISCOUS GAS AROUND A SMALL CYLINDRICAL
BULGE ON THE SURFACE OF A PLATE

Moscow UCH.ZAP.TSENTR.AERO-GIDRODINAM. IN-TA (Scientific Notes
of the Central Aerohydrodynamic Institute) in Russian Vol 6
No 4, 1975 pp 31-40

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76
Abstract No 2.41.106]

[Text] A study is made of the supersonic flow of a viscous gas
around a small cylindrical protuberance on the surface of a plate.
A numerical solution is obtained for the case where the local
Reynolds number is equal to zero, i.e., the local problem is
solved by a Stokes approximation. Heat flow distributions,
frictional stresses, and pressures along the surface of the
body over which the gas flows are derived. It is demonstrated
that on the surface of the protrusion the maximum value of the
heat flow is nearly twice, and the maximum value of the fric-
tional stress is more than three times their corresponding
values for an undisturbed boundary layer on a plate.

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USSR

UDC 629.78.015.3: 533.6.015.04

TUGAZAKOV, R.YA.

METHOD OF ADJUSTMENT FOR SOLVING THE PROBLEM OF THREE-DIMENSIONAL
FLOW AROUND A DELTA WING WITH SUBSONIC EDGES

Moscow UCH.ZAP.TSENTR.AERO-GIDRODINAM. IN-TA. (Scientific Notes
of the Central Aerohydrodynamic Institute) in Russian Vol 6
No 4, 75, pp 64-66

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76
Abstract No 2.41.108]

[Text] The problem of the three-dimensional flow around a
delta wing with subsonic edges is solved by the method of
adjustment. Stationary characteristics are obtained for the
wing subjected to the flow with and without slip for a series
of angles of attack, sweep angles and Mach numbers of the
incident flow.

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USSR

UDC 621.822.5

BELOUSOV, A. I. and CHEGODAYEV, D. YE.

CENTERING THE PLUNGER IN A LONG-TRAVEL SUPPORT RING

TRUDY UFIMSKOGO AVIATIONNOGO INSTITUTA [Works of Ufa Aviation Institute] in Russian No 46, 1975 pp 102-107

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.42 (résumé)]

[Text] An investigation was made of hydrostatic centering of the plunger in the ring of a hydrostatic step bearing by pressure from the chambers. Theoretical relations are given for the restoring force and gas layer rigidity determined for low eccentricities. It is shown that the load factor is a fairly complex function of pressure at the bearing inlet and the design parameter of the bearing surface. The way that the coefficient of rigidity depends on eccentricity is noted, this dependence being linear for the case of limitation to the first two terms of the Taylor's series. Experimental results are given that show satisfactory agreement with the theoretical data. Figures 3, references 2.

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USSR

UDC 629.783.076.6

NOVAK, B.L.

INFLUENCE OF THE AERODYNAMIC MOMENT ON THE ACCURACY OF A DETERMINATION OF THE ORIENTATION OF ARTIFICIAL EARTH SATELLITES

Moscow OPREDELENIYE DVIZHENIYA KOSMICH.APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 24-37

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.69]

[Text] The article deals with the influence of the aerodynamic moment on the accuracy of a determination of orientation for given limitations on the magnitude of the coefficient of accommodation to impulses. It is assumed that orientation is determined by means of momentless models of the motion. A study is made of the errors that arise from the failure to account for the aerodynamic moment in the case where the most unfavorable coefficients of accommodation are realized. Ill 1 Bibl 6.

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USSR

UDC 629.783.076.6

VINGART, R.M. and EL'YASBERG, P.YE.

APPRAISAL OF THE ACCURACY OF DETERMINING THE COEFFICIENTS OF A MODEL OF THE DENSITY OF THE UPPER ATMOSPHERE ACCORDING TO THE DECELERATION OF ARTIFICIAL EARTH SATELLITES

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 16-24

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.68]

[Text.] The authors consider the problem of estimating the accuracy of a determination of the coefficients of a model of the upper atmosphere, the density of which depends on various physical factors. The correlation between measurement errors is considered to be most unfavorable. The influence of the errors of the model for the motion of an earth satellite on the accuracy of the determination of the parameters is taken into account. Results of calculations of the deceleration of earth satellites are presented. Bibl 6

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USSR

UDC 629.78.017.2

PROBLEMS OF ANALYTICAL MECHANICS, THEORIES OF STABILITY AND CONTROL (Academy of Sciences USSR, Department of Mechanics and Control Processes, Ministry of Higher and Intermediate Special Education RSFSR, Kazan' Aviation Institute) in Russian Moscow 1975, 343 pp

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE, No 2, 76, Abstract No 2.41.59 K]

[Text.] The collection of articles consists of reports delivered at the Second Chetayev Conference on analytical mechanics, the stability of motion and optimum control, held in memory of Nikolay Gur'yevich Chetayev upon the occasion of his seventieth birthday. Conference was held 23-26 Jan 1973 in Kazan'.

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USSR

UDC 539.3:534.231.1

CHABANOV, V.E., SHCHEV'EV, Yu.P., and I.Ya. DUBOVNIK, B.E. Bedeneyev All-Union Scientific-Research Institute of Hydro Engineering, Leningrad

DIFFRACTION OF SOUND AT A LARGE CYLINDRICAL CAVITY INSIDE AN ELASTIC MEDIUM

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 3, Mar 76 pp 14-20 manuscript received 3 Jun 74

[Abstract] In order to evaluate the reflective characteristics of certain defects in a material, it is necessary to consider the problem of diffraction at a cylindrical cavity. Some methods of solving this problem become very unwieldy, when applied to such a cavity of large wave dimensions, even with the aid of a digital computer. In the simpler Watson method, the series representing the potential of cylindrical waves is transformed to an integral in the complex plane and evaluated as the sum of residues. A difficulty in this method, which so far has been applied to perfectly diffracting bodies, is locating the poles of the integrand Bessel and Hankel functions (of the first kind). This can be facilitated by replacing these functions by asymptotic Debye representations, as is shown in the case of a plane acoustic wave impinging on a large cylinder in the direction normal to the generatrix of the latter. Figures 4; references 3: 2 Russian, 1 Western.

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USSR

UDC 629.78.533.6.013.14

KOVALENKO, N. D., STREL'NIKOV, G. A., and ZHIVOTOV, A. I.

CONTROLLING THE FORCES GENERATED DURING A NONSYMMETRICAL INJECTION OF A GAS INTO THE SUPERSONIC PORTION OF A NOZZLE FOR THE PURPOSE OF REGULATING THE THRUST VECTOR

KOSMICH. ISSLEDOVANIYA NA UKRAINE. RESP. MEZHVED. SB. (Space Research in the Ukraine. Republic Interdepartmental Collection of Articles) in Russian No 7, 1975 pp 10-13

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.102]

[Text] For a determination of the effectiveness of generating control forces within the nozzle of a space craft engine during a nonsymmetrical injection of a gas into the supersonic portion of the nozzle, the authors present criteria which characterize the energy state of the injected gas and design perfection of the injector and afford the possibility of generalizing the multiplicity of experimental data obtained under real conditions on models of nozzles and on full-scale engines of various thrusts and altitudes within ranges of variation of gas parameters in the main and injected gas flows. For computing the axial and transverse forces the authors present a method of obtaining design data that is both simple and practical. Ill 2 Biblio 4

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USSR

UDC 629.78.532.522

DYNNIKOVA, G. YA.

COMPUTING THE FLOW OF A MIXTURE OF RELAXED GASES DURING ADIABATIC EXPANSION

Moscow UCH. ZAP. TSENTR. AERO-GIDRODINAM. IN-TA (Scientific Notes of the Central Aerohydrodynamic Institute) in Russian Vol 6, No 4, 75 pp 75-81

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76 Abstract No 2.41.100]

[Text] The nonequilibrium stationary flow in a supersonic nozzle of a mixture of gases $N_2 + CO_2 + H_2O$ is computed by means of relaxation equations that account for the oscillatory transitions into molecules at all energy levels in the vicinity of an harmonic oscillator. The results obtained are compared with calculations based on simplified kinetic models. An explanation is given of the feasibility of employing the concept of a thermodynamic equilibrium between the asymmetrical CO_2 mode and the N_2 oscillations. The dependence of the solution on the selection of velocity constants of several insufficiently studied reactions is discussed. Ill 4 Bibl 7

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USSR

UDC 629.78.076.6

ANISIMOV, V.D., MARKOVA, L.G., NAZARENKO, A. I., and
POZDHYAKOV, I. G.

ACCOUNTING FOR THE FLUCTUATION OF THE RESISTANCE OF THE ATMOSPHERE IN THE PREDICTION AND DETERMINATION OF THE ORBITS OF EARTH SATELLITES

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining the Motion of Space Vehicles, Collection of Articles) in Russian 1975 pp 3-15

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76
Abstract No 2.41.67]

[Text] Problems of practical realization and modeling of the algorithm of successive processings of measurements are considered. Results are given of a modeling of the positional vector of a dynamic system perturbed by a correlated gaussian random process. Results of the modeling show that accounting for the fluctuations of atmospheric drag increases the accuracy of the determination of the orbits of earth satellites and the accuracy predicting their motion in the atmosphere. Ill 6 Tab 2 Bibl 4

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USSR

UDC 629.78.015.3:533.6.015.04

SUKHARIKOV, YU. V. Sbornik nauchnykh trudov Kievskogo instituta inzhenernoy grazhdanskoy aviatsii [Collected papers of the Kiev Civil Aviation Engineering Institute] in Russian No 5, 1969 pp 73-78

HEURISTIC MODEL OF FLOW CONTROL OVER A WING

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.76 by A. V. U.]

[Abstract] On the basis of an analysis of experimental data, a vortex model is proposed to control the nature of flow about a wing. It is assumed that attached flow is related to the establishment of a vortex system at the wing which would suppress the Karman vortex street. Such a system is created by a high-speed stream blowing tangentially to the surface of the profile in the zone of flow detachment. Use of the model explains such facts as how low stream effectiveness is at small flap angles; the waveform distribution of pressure in the zone of elevated speeds; the influence on the effectiveness of blowoff at the slot location; the Coanda effect. Figures 7; references 7.
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USSR

UDC 629.78.017.2

MITROSHIN, E. I., YELISEYEV, V. D., VASILYEV, V. A., and GLINSKIY, V. A. Trudy Moskovskogo aviatsionnogo instituta [Proceedings of the Moscow Aviation Institute] in Russian No 330, 1975 pp 21-27

CERTAIN PROBLEMS IN STOCHASTIC TRAJECTORY CONTROL OF AN AIRBORNE VEHICLE

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.58 by A. V. U.]

[Abstract] The problem that is examined concerns automatic stochastic control of motion toward a given point in space. The desired trajectory is determined from the condition of minimizing coordinate errors in the end point, as compared with the programmed coordinates, as well as minimizing waste in motion control. The principle of stochastic equivalence is used. An analytical solution of the motion equations is offered as the programmed one, taking into account the hypothesis of equilibrium gliding. The synthesis of the optimum tracking system is based on the analytical designs of the controllers. A simplified correction method is proposed which is based on the modified proportional navigation method. An example shows that the proposed solution provides given control accuracy and quality.
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USSR

UDC 629.78.017.2

PETROV, B. N. and ZAVEDEYEV, A. I., Tr Moskovskogo aviatsionnogo instituta [Proceedings of the Moscow Aviation Institute] in Russian No 330, 1975 pp 5-9

SYNTHESIS OF ONE CLASS OF NONLINEAR AUTOMATIC SYSTEMS UNDER RANDOM PERTURBATIONS

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.60 by A. V. U.]

[Abstract] A system of automatic stabilization of a plane angular solid body with a given structural design is investigated. The system satisfies the requirements for the application of the statistical linearization method. The problem consists in the determination of the impulse transfer functions of the system that provide a minimum value of the second initial moment of angular error for a given transfer process duration and a given mean error value in the established state. Statistically optimum synthesis was used for the solution. An expression is obtained for the transfer function of an optimum series filter. Figure 1; references 2.
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USSR

UDC 629.78.017.2

Trudy Kazanskogo aviatsionnogo instituta [Proceedings of the Kazan' Aviation Institute] in Russian No 188, Kazan' 1975 57 pp figs 26 kop

OPTIMAL PROCESSES [BOOK]

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.61K]

[Abstract] The following papers appear in this collection: T. K. Sirazetdinov, "Necessary and sufficient conditions for optimal control processes;" Yu V. Kozhevnikov and L. T. Ambaratsumov, "Certain problems of adaptive filtering;" R. K. Akhmetov and V. A. Petrov, "The problem of optimum filtering of random processes;" V. P. Cheprasov, and I. N. Agliulin, "Adaptive radiation algorithms for random fields;" A. Yu. Afanas'yev, "On the properties of a set of minimum points of a function with parameters;" N. F. Degtyareva, "On optimum control by linear stochastic systems with distributed parameters;" V. P. Cheprasov, "On the estimate of the convergence rate of instruction algorithms for random fields;" G. L. Degtyarev, "Optimal control of stochastic processes with distributed parameters and a local quality criterion;" I. P. Ul'trivanov, "Selection of weight coefficients in the AKOR problem for a hydrodynamic process;" I. Kh. Khalitov, "On one problem of synthesizing optimal control in stochastic processes with distributed parameters."
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USSR

UDC 629.78.017.2

KOZHEVNIKOV, YU. V., and AMBARTSUMOV, L. G. Trudy Kazanskogo aviatsionnogo instituta [Proceedings of the Kazan' Aviation Institute] in Russian No 118, 1975 pp 7-12

SOME QUESTIONS ON ADAPTIVE FILTERING

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.63 Resume]

[Abstract] New approaches are examined to the problem of optimum filtering of random processes. The possibility of improving the Weiner-Kalman estimate is noted.

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USSR

UDC 629.78.017.2

AKHMETOV, R. K., and PETROV, V. A. Trudy Kazanskogo aviatsionnogo instituta [Proceedings of the Kazan' Aviation Institute] in Russian No 188, 1975 pp 12-16

THE PROBLEM OF OPTIMUM FILTERING OF RANDOM PROCESSES

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.64]

[Abstract] A new approach is offered to the solution of the problem of optimum filtering of random processes. Using the procedure of the dynamic programming method, an equation is obtained that in a specific sense is an analog of the R. Bellman functional equation, the solution of which is sought in quadratic form. References 4.

Resume

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USSR

UDC 629.78.017.2

YELISEYEV, V. D., and GLINSKIY, V. A., Trudy Moskovskogo aviatsionnogo instiuta [Proceedings of the Moscow Aviation Institute] in Russian No 330, pp 32-36

TERMINAL TRAJECTORY CONTROL OF AN AIRBORNE VEHICLE WITH AN INTEGRAL LAW

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.59 by A. V. U.]

[Abstract] The problem of terminal control is examined for guiding an airborne vehicle to a point in space which is determined by finite altitude, longitudinal and lateral ranges, and course angle. Control is derived from programmed factors that are acquired along the trajectory. The law of control in the longitudinal plane is derived with respect to vertical loading; the control coordinates are obtained from the angles of attack and bank. In the lateral plane two control laws were investigated. Both are comparable with respect to course angle errors in the target point. Figures 2; references 1.

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USSR

UDC 624.07:627.824

BEREZINSKIY, S. A., and PIGALEV, A. S.

POSSIBLE TREND IN THE IMPROVEMENT OF THE DESIGNS OF GRAVITY DAMS ON ROCK BASES

Moscow GIDROTEKHNICHESKOYE STROUTEL'STVO No 5, 76 pp 11-16

[Abstract] A new lighter-weight gravity-dam design concept is proposed wherein the dimensions of the dam are decided on the basis of the compressive strength of the concrete used in the area of the lower face. At the upper face the generation of tensile stresses and cracking are tolerated. A description is given of the design measures that guarantee the reliability of such a dam. Theoretical and experimental results are given. On experimental models load-tested to failure the safety factor was 1.5 - 1.7. A 20-percent reduction in volume and cost is to be expected with the new design. Ill 4 Tab 4 Bibl 8

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USSR

UDC 693.54:666.97.022.1/5"324"

PETROV, G. D. (deceased) and UZHENKOV, YE. YA.

STUDY OF WINTER CONCRETE WITH UNHEATED AGGREGATES

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO No 2, Feb 76 pp 15-20

[Abstract] The problem is considered of the necessity of heating the aggregates of concrete in winter in various areas of the USSR. Emphasis is placed on the moisture content of coarse aggregate as a decisive factor in the feasibility of dispensing with the heating of concrete in winter operations. Large-scale experiments were conducted both in the laboratory and at construction sites for evidence that concrete produced with cold aggregates does not differ in quality from concrete poured in summer. On the basis of the fact that the quality of concrete with large (up to 120-mm) aggregate with moisture content of up to 1.5% and temperature down to minus 30°C, with heating only of the sand and water, is equal to the quality of concrete produced under existing winter technology with heating of all components, there is good promise that winter concreting can be done with unheated coarse aggregates. Bibl 5

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USSR

UDC 627.8.065:627.8.042.7

RASSKAZOV, L. N.

STRESSES IN DAMS WITH ALLOWANCE FOR THE PROPAGATION VELOCITY OF SEISMIC WAVES
IN THE FOUNDATION OF THE STRUCTURE

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO No 2, 76 pp 23-28

[Abstract] A method is considered for computing the effect of a "traveling wave" in a dam foundation of local materials on its stress-strain condition. The method of finite elements is used to solve the two-dimensional (according to deformations) dynamic problem of the theory of elasticity. The main aspects of the method are explained, and the stress condition is analyzed for two structurally different dams for different initial data. In the case of earth dams, the effect of a traveling wave depends not only on the geometry, dimensions, and material of the structure, but also on the deformation properties of the underlying soils; this should be taken into account in those cases when the rate of propagation of seismic waves along the base of the dam is equal to or greater than the half-period of its oscillation in the fundamental tone. In calculations the accounting for the effect of a traveling

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USSR

RASSKAZOV, L. N., GIDROTEKHNICHESKOYE STROITEL'STVO No 2, 76 pp 23-28

wave is reduced to the redistribution of the dynamic stresses in the dam (asymmetry of dynamic stresses along the profile) with relatively small changes in absolute value, and a reduction of the maximum displacements of the crown and increase in the difference in the moments of time (phase difference) for the emergence of the maximum dynamic component of the stresses for different elements of the profile. These conclusions imply an elastic behavior of the structure. Accounting for the nonlinear behavior of the soils under intensive seismic effects requires further study.

Ill 8 Bibl 7

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USSR

UDC 624.131.5:627.824.33

BOUGROVA, A. K. and GREBNEV, K. K.

CALCULATING THE STRAINS AND STRESSES IN EMBANKMENT DAMS AND IN THEIR FOUNDATIONS

Moscow GIDROTECHNICHESKOYE STROITEL'STVO No 6, 76 pp 19-23

[Abstract] The authors discuss the difficulty of solving the two-dimensional, physically nonlinear problems for earth dams and their foundations. Some information is given on a program for solving these problems by computer using the method of finite elements. Examples are given, and the results of the calculations and the influence of various factors on them are explained. The efficacy of compression and shear tests for obtaining the nonlinear physical relationships is demonstrated. Obtaining the nonlinear relationships in the desired form directly from tests requires test instruments with three independently directed stresses, and the rigging of these test instruments must be done by the industrial laboratories. The peculiar behavior of soils under stresses involves the nonlinearity of stress and strain coupling, expansion characteristics and variation of deformability from the degree of compaction

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USSR

BOUGROVA, A. K. and GREBNEV, K. K., GIDROTECHNICHESKOYE STROITEL'STVO No 6, 76 pp 19-23

to the limit of equilibrium. The solution of the physically nonlinear problems for dams and soils provides a more reliable determination of their stress-strain condition, and the solution of the nonlinear problems by computer opens new possibilities for design practice. Ill 4 Bibl 4

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EAST GERMANY

ROETHIG, H., Dr of natural sciences, Institute of Reinforced Concrete, Dresden

NONDESTRUCTIVE TESTING OF AERATED CONCRETE PARTS. A REVIEW OF THE STATE OF THE ART

East Berlin BAUSTOFFINDUSTRIE in German, Series B Vol 19 No 2, Apr 76 pp 16-21

[Abstract] East-German Standard TGL21,098/02 on the testing of aerated concrete parts specifies the use of standard blocks as samples. The preparation of the sample blocks and the destructive methods specified are tedious and time-consuming. The author therefore reviewed the extensive literature on the subject with the aim of establishing a series of nondestructive tests with which the quality characteristics of aerated concrete parts can be determined simpler, faster, and at equal accuracy as with the standardized methods. The various test methods quoted in the literature were described and evaluated for accuracy, usefulness, error, equipment needs, and time needs. The following methods were judged suitable: determination of moisture (neutron moderation method),

1/2

EAST GERMANY

ROETHE, BAUSTOFFINDUSTRIE Series B Vol 19 No 2, Apr 76 pp 16-21

determination of gross density (gamma-backscatter or transmission method), and strength (ultrasonic method or bounce hammer method). Tests on aerated concrete parts were carried out by means of these methods. The results indicated that they are adequately accurate but that they alone do not provide sufficient information on the test samples to permit these tests to be approved as substitution for the tests specified in the current standard. More laboratory tests and studies are needed before this problem can be satisfactorily resolved. Figures 5; table 1; references 57: 10 Western, 1 Polish, 1 Czechoslovak, 9 Russian, and 36 German.

2/2

USSR

UDC 536.46:537.28

MEDVEDEV, M. A., MAKSIMOV, N. N., ABRUKOV, S. A. and NOVIKOV, V. YE.

EXPERIMENTAL STUDY OF THE ACTION OF A LONGITUDINAL ELECTRIC FIELD ON FLAME PROPAGATION IN A VERTICAL SEMI-OPEN CHANNEL

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [Combustion Physics and Ways to Study it, Collection of Works] in Russian No 4, 1975 pp 91-102

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 1, 1976 Abstract No 1.34.22 (résumé)]

[Text] A detailed description is given of an experimental installation and research procedure. The results are given from experiments on determining the influence that a fixed electric field has on steady and vibration flame propagation in a vertical semi-open channel. These results show that the electric field has an appreciable influence on flame propagation, and is an effective means of acting on vibration flame propagation in channels. Figures 7, references 7.

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USSR

UDC 629.7.036:533.697.4

DYNNIKOVA, G. YA.

CALCULATING THE FLOW OF A MIXTURE OF RELAXING GASES WITH ADIABATIC EXPANSION

UCHENYYE ZAPISKI TSENTRAL'NOGO AEROGIDRODINAMICHESKOGO INSTITUTA [Scientific Annals of the Central Aerohydrodynamics Institute] in Russian Vol 6, No 4, 1975 pp 75-81

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 1, 1976 Abstract No 1.34.75 (résumé)]

[Text] Nonequilibrium steady-state flow is calculated for a gas mixture of $N_2 + CO_2 + H_2O$ in a hypersonic nozzle using relaxation equations that account for vibrational transitions in molecules on all energy levels in the harmonic oscillator approximation. The results are compared with calculations by simplified kinetic schemes. The paper shows the feasibility of assuming thermodynamic equilibrium between the symmetric mode of CO_2 and vibrations of N_2 . An investigation is made of the way that the solution depends on the choice of rate constants for some inadequately studied reactions. Figures 4, references 7.

1/1

USSR

UDC 538.4

DERKACH, P. Kh. and DERKACH, A. P., Dnepropetrovsk State University

BOUNDARY LAYER AT A HEATED LONG CYLINDER IN AN AXIAL STREAM OF FLUID AND IN
A RADIAL MAGNETIC FIELD

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 1, Jan 76 pp 98-105 manuscript
received 24 Dec 74

[Abstract] A heated long cylinder of a nonideally conductive material is located in an axially flowing stream of a slightly electroconductive medium. The streamlines are meridional and the flow is thus two-dimensional. A constant radial magnetic field is applied, while the magnetic field induced by the flow of the conductor medium remains negligible. The fundamental equations with appropriate boundary conditions are derived for this system, to be solved by numerical methods. The parameters of the boundary layer are obtained as a result, namely: the fluid velocity and temperature as well as the drag coefficient and the local rate of convective heat transfer. Figures 4; references 4: all Russian.

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USSR

UDC 629.7.036:533.6

VARGANOV, I.S., Kiev Military College of Aviation Engineering

GAS DYNAMICS IN COMBUSTION CHAMBERS OF GAS TURBINES

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 2, Feb 76 pp 111-116 manuscript
received 25 Jun 74

[Abstract] An important problem in the design of combustion chambers for gas turbines is determining the necessary gas rate in the injected jet, relative to the gas rate in the main stream, and allowing an adequate zone for reverse circulation flow. An analytic expression for this gas rate is derived here, on the assumption that a certain pressure develops behind the jet within that zone. It is also assumed that no mixing, no heat transfer, and no losses occur within the active zone of merger extending from where the jet makes contact with the main stream to where both become parallel to the axis of the combustion chamber. The geometry of the zone allowed for reverse circulation flow is then determined on the basis of this gas rate as well as on the overall geometry and performance parameters, including the air requirement for cooling and the air loss through leakage. Figures 3; references 8: all Russian.

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USSR

UDC 621.762

BELOV, S. V., KARTUYESOV, O.G., and POLYAYEV, V. M.

HYDRAULIC DRAG OF POROUS METALS AND BEDS OF SPHERICAL PARTICLES

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 4, 76
pp 60-63 manuscript received 25 Jun 75

/Abstract/ A study is made of the hydraulic drag of specimens of porous bronze and porous 50KhG steel made up of spherical particles. Results of the study are compared with data obtained by nine other authors and published in the period 1948-1972. On the basis of this comparison, the authors derive, for computing the hydraulic drag coefficient of beds and porous metals of spherical particles, a generalized criterial relationship that holds true for modes of laminar transient and turbulent filtration of liquids and gases in pores. This relationship,

$$\zeta_d = \frac{152}{Re_d} (1 + 5.56 \cdot 10^{-3} p^{-1.72} Re_d^{0.9}),$$

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USSR

BELOV, S. V., et al, IZVESTIYA VUZOV MASHINOSTROYENIYE No 4, 76
pp 60-63

applies for computing the hydraulic drag coefficient of porous metals and beds of 35-30,00-micron spherical particles with porosity variation from 0.16 to 0.424 in the Reynolds number range of 0.01-2,300. Ill 2 Bibl 9

2/2

USSR

UDC 621.226

PROKOF'YEV, V. N., PIL'GUNOV, V. N., and PETROV, YU. A.

COMPATIBLE FUNCTIONING OF A HUMAN OPERATOR WITH AN HYDRAULIC
SERVO DRIVE

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 4, 76
pp 64-69 manuscript received 5 Jun 75

[Abstract] A description is given of an experimental installation for studying the operational capacity of a biotechnical system made up of a human operator and hydraulic servo drive for machine control. Experimental determinations were derived for the type and parameters of the transfer function of the human operator during operation with a given class of machines in the mode of pursuit- and compensation-tracking of a single stepwise signal for various structures of the machine portion of the biotechnical system. Parameters of the "motor" outputs of the human operator in the control mode are derived. An analysis of the harmonic signal tracking data in the pursuit mode

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USSR

PROKOF'YEV, V. N., et al IZVESTIYA VUZOV MASHINOSTROYENIYE
No 4, 76 pp 64-69

shows that the human operator can be considered a low-frequency filter with upper passband limit of 1.2-1.5 Hz. The duration of the net sensomotor reaction of the human operator does not exceed 0.75-0.80, and depends on his or her training and exhaustion factor. Ill 3 Tab 2 Bibl 4.

2/2

USSR

UDC 556.536.2.001.57

PRUDOVSKIY, A. M., and KISSIN, V. A.

MODELLING OF NONUNIFORM AND NONSTATIONARY FREE CHANNEL FLOWS
BY THE GRAVITY-ELASTIC ANALOGY METHOD

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO, No 6, 76, pp 36-40

[Abstract] A method and installation for modelling nonuniform and nonstationary free flows by the gravity-elastic analogy are described, and a system of determinant similitude criteria is obtained. The installation employs a head of water delivered into an undulating trough with an elastic covering. The required proportionality between the displacements of various points of the surface of the flexible cover and the pressure at these points is maintained. Seven parameters can be tested on the installation. The experimental method used with this gravity-elastic flow machine with pressurized flow can be applied to two-dimensional free flows within a wide range of modes. Ill 4 Bibl 4

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USSR

UDC 624.042.8:691.327:666.972.52

SHUYFER, M. I., VASILENKO, V. G., VERKHUTINA, G. I., and AZARKOVICH, A. YE.

DETERMINING CRITICAL DYNAMIC LOADS ON HYDRAULIC ENGINEERING CONCRETE

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO No 1, 76 pp 19-24

[Abstract] Results are given of experimental work on estimating the change in strength of concrete specimens under the effects of dynamic, including explosive, loads exerted during hardening. It was found that a reduction in the strength of concrete from dynamic effects depends on the magnitude and number of loads and the age of the concrete. Formulas are given for determining the critical level of dynamic loading. For hardening hydraulic engineering concrete a close connection was established between the strength of the concrete at a particular time and the rate of propagation of longitudinal waves through it. The critical mass of explosive charge placed 20 meters from type M200 concrete is 185 kg after one day and 464 kg after seven days.

Ill 7 Tab 5 Bibl 4

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SOLOVIN, V. I. and VOLOBUYEV, A. N.

INFLUENCE OF TRANSVERSE MASS FLOW ON SELF-SIMILAR FIELDS

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 1, 76
pp 101-106 manuscript received 12 May 75

/Abstract/ The authors consider the surface protection of a duct by means of blowing-in of a foreign gas (air) where a transverse mass flow toward the surface in the main flow is caused, for example, by evaporation of the material. They obtain and solve self-similar equations of motion and of heat- and mass exchange along the inlet portion of flow in a cylindrical duct. A special equation is obtained that accounts for the axial symmetry of the problem. The dependence of the fields on transverse mass flow is analyzed. It is shown that the transverse mass flow leads to strong velocity- and temperature-concentration profiles in the flow. Ill 2 Bibl 5

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USSR

UDC 621.974:621.983.06.4

CHECHETA, I. A., Candidate of Technical Sciences, Voronezh Polytechnic Institute

HIGH-SPEED IMPULSE HAMMER

Kiev TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 4, 1976 pp 37-38 manuscript received 14 Jul 75

[Abstract] This article is concerned with the development of a high-speed hammer which is distinguished from its domestic and foreign counterparts by its smaller dimensions. A comparison is made between this hammer equipped with a gas-dynamic drive and a thermal one. The prospects of increasing the energy resources rest on the broad range of energy carriers developed by the aviation, rocket and other branches of industry. Figure 1; references 2: 2 Russian.

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USSR

UDC 621.822.71

VOLOKUSHIN, V. F., Engineer, Eighteenth State Bearing Plant, Vinnytsa

CAUSES OF THE FORMATION OF TROOSTITE SPOTS ON THE BALLS OF BEARINGS AND WAYS TO REMOVE THEM

Kiev TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 4, 1976 pp 46-47 manuscript received 18 Sep 75

[Abstract] Troostite spots are formed often on steel and are a source of fracture of the finished product. This article is concerned with the reasons for such formations. Experiments were conducted on various samples and it was found that the structure of the metal has little influence on the formation of troostite spots. Tests revealed that the use of a chute system satisfying the necessary requirements will allow the number of balls with spots to be reduced up to 5% and the depth up to 0.02 mm. Figure 1.

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USSR

UDC 621.92:661.882:621.922.025

ADAMOVSKIY, A. A., Engineer and BEZYKORNOV, A. I., Candidate of Technical Sciences, Institute of Problems in Material Research of the Ukrainian SSR Academy of Sciences

POLISHING TITANIUM ON A GRINDING WHEEL ON A BAKELITE BOND

Kiev TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 2, 1976 pp 31-32 manuscript received 4 May 75

[Abstract] This article concerns an investigation of the contact temperature in the polishing zone and the quality of the surface layer of titanium and alloys after polishing on wheels on a bakelite bond of traditional materials. Titanium carbide is produced by synthesis of elements in plasma. The investigation revealed that in polishing titanium with abrasive materials having different plasticity the quality of the surfaces will also differ. The more plastic abrasive materials have a greater specific productivity and the stresses in the surface layer depend on the temperature and mechanical characteristics of the abrasive grain. Figures 2.

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USSR

UDC 621.787.4

STEPANCHENKO, V. A., VARNAVSKIY, I. N., Candidate of Technical Sciences, SKRYABIN, S. A. and RATUSHNIY, I. G., Engineers, Kiev Aviation Production Union

PRODUCTION OF BILLETS OF AK6 ALUMINUM ALLOYS BY ROLLING

Kiev TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 2, 1976 pp 35-36 manuscript received 13 Jun 75

[Abstract] Previously used methods of producing AK6 aluminum alloy billets have met with less than complete success. The authors of this article describe a process in which the billets are rolled on forging rollers in the die sector with gauges close to the shape of the cross section of the billet to be processed. As a result of this process today more than 100 types of products are being made with a variable cross section along the axis. The economic effect has been 50,000 rubles. Table 1.

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USSR

UDC 621-231.1

KOBRINSKIY, A. A., and KOBRINSKIY, L. A.

MANIPULATOR MOBILITY AND ACCURACY

Moscow MASHINOVEDENIYE in Russian No 3, 76 pp 3-9 Manuscript
received 31 Jul 75, revised 9 Oct 75

[Abstract] Two global (averaged for all possible manipulator configurations) estimates of the quality of a manipulaor are made. The first, the "modality" estimate, expresses manipulator quality with respect to rate of motion (under the assumption that the rates of variation of the generalized coordinates are limited). The second estimate is concerned with the accuracy properties of the manipulator (accuracy of the positioned grasping operation). A method is devised for computing these estimates, and some of their properties are discussed.
Ill 5 Bibl 5

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EAST GERMANY

HOFMANN, W., graduate metallurgist, KOCH, H., Dr of engineering, and LERCHE, W., graduate engineer, Schmalkalden Tool Combine State Enterprise and Metallurgy and Materials Science Section, Freiberg Mining Academy

INFLUENCE OF THE NITRIDATION CONDITIONS ON THE PROPERTIES OF CHIP-FORMING TOOLS

East Berlin DIE TECHNIK in German Vol 31 No 6, Jun 76 pp 397-401

[Abstract] The effects of annealing conditions, nitridation depth, protective gas composition, nitridation procedure (bath or gas), and nitrodatation time on the properties of chip-forming tools were investigated. It was found that improvements by nitridation were obtained only on some tools, mainly those which have an adequate toughness reserve (such as reamers with at least 6 mm diameter, thread cutters with at least 10 mm diameter, milling tools ground on one side only, and broachers with more than 15 mm diameter). Bending tests may be used to evaluate the nitridation results. Figures 16; references 23: 5 Russian, 2 Western, and 16 German.

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EAST GERMANY

WIETECK, Peter, engineer, and KONITZKI, Bernd, engineer, Central Energy Combine State Enterprise, Potsdam

RESULTS OF THE ENERGETIC STUDY OF THE MELT-CAST OPERATION IN THE GRUENHAIN ELECTRIC MOTOR FACTORY STATE ENTERPRISE

Leipzig ENERGIEANWENDUNG in German Vol 25 No 4, Apr 76 pp 105-107 manuscript received 13 May 75

[Abstract] The aim of the study was to reduce the energy consumption of the melt-cast process, where melt-crucible furnaces are used. It was indicated that an approximately 11% reduction can be achieved by administrative, technological, and design changes. Among the changes are: reduction of time between batches so as not to heat the furnace without melt for undue lengths of time, installation of a batch stirrer, fitting of a lid, reduction of resistance by better heating-coil design, reduction of radiant heat loss by suitable surface coating, redesign of the warm-keeping vessels, and improved metering. These measures produced the desired result. Figures 2; references 2: both German.

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USSR

UDC 539.374

SHCHEGLOV, B. A. (Moscow)

COMPUTING THE PARAMETERS OF THE DYNAMIC PROCESSES OF SHAPING
THIN METAL SHEETS

Moscow MASHINOVEDENIYE No 1, 76 in Russian manuscript received
30 Jan 75

[Abstract] Methods are described for determining the main parameters of the dynamic processes of plastic deformation of thin metal sheets, pressure on the billet and critical rate of impact. Relationships are devised for determining the dependencies of the rates of propagation of the longitudinal and transverse plastic waves on stresses and strains that act upon the leading edges of these waves. A description is given of the wave processes of propagation of plastic deformations and the influence of viscosity on these processes. Ill 4 Bibl 17

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USSR

UDC 666.1.031.24

DZYUZER, V. YA., KOZLOV, A. A., KOKAREV, N. I., PCHELYAKOV, K.A.,
and ISBIRYAKOV, V. A.

DEPENDENCE OF THE INCIDENCE ANGLE OF THE FLAME JET ON DESIGN
PARAMETERS OF A SHAFT FURNACE

Moscow STEKLO I KERAMIKA in Russian No 3,76 pp 8-10

[Abstract] On the basis of experimental studies on shaft furnaces with lateral fuel feed, it was established that the angle of incidence of the flame jet can be calculated on the basis of the parallelogram rule for the quantity vectors of the motion of the fuel and air. Only 77 percent of the total amount of motion of the air need be taken into account in the calculation. Studies of the gas velocity distributions in the working space of the furnace as functions of the incidence angle show that the maximum velocity of motion of the gases near the surface of the bath is observed at angles of incidence of 20-23 degrees, thus furnace designs should guarantee this angle of incidence in order to provide a flat steady flame jet. Ill 3 Bibl 5

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USSR

UDC 666.189.21

SHULE, E. KH.

STUDY OF THE PECULIARITIES OF THE FIBER FORMATION PROCESS DURING
CONTINUOUS MATERIAL FEED TO THE GLASS MELTING VESSEL

Moscow STEKLO I KERAMIKA in Russian No 4, 76 pp 16-17

[Abstract] It is shown that in the characteristic process of glass fiber formation by continuous feeding of pellets into the vessel a response by the level of the melt to a change of temperature produces a stabilization of melt discharge. A variation of the method with decentralized continuous material feed achieved a sufficiently uniform motion of the column of glass pellets to guarantee the stabilization of the linear density of the emergy glass fiber at a level that is characteristic of the glass fiber production process by batch feeding of the glass pellets into the vessel. Ill 3 Bibl 1

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USSR

UDC 658.562:62-653

TSERTSVADZE, R. V., ROMANOV, V. L. and DYMSHITS, YE. S.

SEVERAL QUESTIONS IN MONITORING THE QUALITY OF ELECTROAUTOMATION
DEVICES

Moscow METROLOGIYA in Russian No 4, 1976 pp 3-9

[Abstract] The authors are concerned with certain problems involved in quality control of electroautomation devices. They suggest monitoring the quality of electroautomation devices using general-purpose test stand simulators which are capable of receiving control signals from the electroautomation devices and returning responses. The authors' approach will allow automating the operations of quality control for electroautomation devices and significantly raise the productivity of labor during these operations. Figures 3.

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USSR

UDC 531.787.087.92.089.68

BAGDAT'YEV, YE. YE., YEFIMOVA, A. A., SANINA, E. B. and SMIRNOV, V. A.

CREATION AND INVESTIGATION OF SYSTEMS FOR CALIBRATING PRIMARY MEASURING CONVERTERS OF VARIABLE PRESSURES

Moscow METROLOGIYA in Russian No 4, 1976 pp 30-34

[Abstract] The authors are concerned with the creation and investigation of systems for calibrating the primary measuring converters of variable pressures. They examine questions involved in the creation of wide-band pulsators with piezoelectric excitation operating in subresonance and resonance modes. They also study impulse test benches with electrical excitation for generating individual microsecond pressure impulses. The impulse input effect makes it possible to substantially refine the natural frequencies and damping of the oscillational system of the calibration converter. Figures 2;

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USSR

UDC 62-226.001.2

LEBEDEV, V. A., Candidate of Technical Sciences, KURCHIK, Z. M., PISARENKO, V. S., LIL'BOK, E. E. and KLEYNENBERG, M. G., Engineers

SYSTEM OF PROGRAMS FOR PLANNING TECHNOLOGICAL PROCESSES IN THE PUNCHING OF TURBINE BLADES

Leningrad ENERGOMASHINOSTROYENIYE in Russian No 1, 1976 pp 29-31

[Abstract] The authors give a brief description of an automated system of programming the punching of turbine blades. From the research they concluded that the system of programs allows the use of a computer to satisfy the computational part of the technological process and fittings for punching of turbine blade forgings. They also found that the programs make it possible to reduce engineering time, raise the quality of the projected processes and produce a savings in metal because of the increased accuracy in computation. These programs have a modular structure and may be supplemented by new problems of a technical and economic nature. The program is used for planning technical documentation for punching turbine blade forgings. Figures 5; table 1; references 4: 4 Russian.

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USSR

UDC 621-2311

BRUYEVICH, N. G., and DOSTUPOV, B. G. (Moscow)

METHOD OF DETERMINING THE VELOCITY AND ACCELERATION ERRORS OF MECHANISMS

Moscow MASHINOVEDENIYE in Russian No 3, 76 pp 27-34 manuscript received 23 Jan 76

[Abstract] Regarding the problem of determining for the driven link of a mechanism those velocity and acceleration errors that are caused by the effect of primary errors, the authors consider the possibility of using a method of solution that combines the graphic procedures of the method of the transformed mechanism (one primary error differs from zero, the rest are equal to zero, and the position of the driving link is fixed) with calculation by computer. It is shown that, for each given position of the driving link and given values of the rate of motion and acceleration of this link, it is possible to determine the values for the mathematical expectation and dispersion of the velocity and acceleration errors of a driven link. This method affords the

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USSR

BRUYEVICH, N. G., and DOSTUPOV, B. G., MASHINOVEDENIYE No 3, 76 pp 27-34

possibility of studying the velocity and acceleration errors of a mechanism even in the case when the analytical dependence of the coordinates of the driven link on the primary errors is not known. Ill 6 Bibl 1

2/2

USSR

UDC 621-503.52

BELIANIN, P.N., VOSKRESENSKIY, V. V., and PRONINA, M. A.

PLOTTING THE PROGRAMMED MOTION OF THE LINKS OF A MANIPULATOR
ALONG A GIVEN TRAJECTORY

Moscow MASHINOVEDENIYE in Russian No 1, 76 pp 6-11 Manuscript
received 23 Apr 75

[Abstract] A method is given for deriving the differential equations of motion for the links of a manipulator that moves a technological instrument or tool with required orientation along an analytically prescribed trajectory. The problem is solved in two steps, the first being the formation of a system of differential equations that characterize the motion of the tool along a given trajectory at a given speed or acceleration in a rectangular system of coordinates. This system determines the level of operation of the part or link. Secondly, for a manipulator with a concrete kinematic scheme in generalized coordinates a second system of differential equations is developed from which is found the law of motion of each generalized

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USSR

BELIANIN, P.N., VOSKRESENSKIY, V.V., and PRONINA, M. A.,
MASHINOVEDENIYE No 1, 76, pp 6-11

coordinate. Presented as an example is the motion of a tool along an ellipse executed by a six-link manipulator, whereby the axis of the tool as the tool moves must maintain the perpendicular orientation of the plane of the ellipse. Equations are derived for the change of the generalized coordinates in relation to the absolute coordinates.
Ill 1 Bibl 7

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USSR

UDC 621-503.55

KOBRINSKIY, A. A. and KOBRINSKIY, A. YE. (Moscow)

PLOTTING THE OPTIMUM MOTIONS OF MANIPULATOR SYSTEMS

Moscow MASHINOVEDENIYE in Russian No 1, 76 pp 12-18 manuscript received 27 Mar 75

[Abstract] A method is suggested for plotting the optimum motions of manipulator systems with motive excess; optimality criteria are formulated, for which the necessary conditions of the extremum are found. The motion of a manipulator system in an environment with obstacles is considered. A concept is introduced regarding the so-called tropism of the system and the property that prevents it from approaching an obstacle at a distance less than a certain safe value. An algorithm is derived that provides the optimum form of realizing this property. One limitation of the algorithm is that, by using linearized conditions, it allows the system to move within the danger zone. Thus, if the manipulator system executes a

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USSR

KOBRINSKIY, A. A. and KOBRINSKIY, A. YE., MASHINOVEDENIYE, No 1, 76, pp 12-18

grasping operation within the danger zone near an obstacle the change of distance to the obstacle is uncontrolled at the level of the synthesis of the motions, but is determined by the smoothing level. If the smoothing level programs the grasping motion within the danger zone (which is necessary if the manipulator is to hold on to the object), then the danger condition is inapplicable to the remaining links in the system and must be modified accordingly. Bibl 9

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USSR

UDC 666.1.031:532.405

GULOYAN, YU. A.

ASSESSMENT OF CERTAIN FACTORS THAT INFLUENCE THE PROCESS OF DIFFUSION OF SOLID PARTICLES IN GLASS MELTS

Moscow STEKLO I KERAMIKA in Russian No 3, 76 pp 10-12

[Abstract] Results are given of a general analysis of the process of dissolving (diffusion) of solid particles in high-viscosity melts, with the influence of the size of the particles and hydrodynamic conditions taken into account. The role of the shifting of the melt during the dissolving of small particles is explained. The data obtained may be used for an assessment of the processes of dissolution under manufacturing conditions, for example, during the founding and coloring of a glass mass in a direct flow with the use of intensifiers. Bibl 5

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USSR

UDC 666.3.032.6:531.424

BARKOVA, L. S., and BELOPOL'SKIY, M. S.

INFLUENCE OF CERTAIN TECHNOLOGICAL FACTORS ON THE DENSITY OF SINTERED PRESSED PARTS

Moscow STEKLO I KERAMIKA in Russian No 3, 76 pp 24-25

[Abstract] Quantitative connections are established among the density of the sintered specimen, the density of the pressed raw material and the moisture-content of the dross. When electrolytes are introduced up to a certain limit the density of the sintered specimen increases. Increasing the content of dross reduces the density of the sintered specimen. The density of the sintered specimens increases with increased fineness of the material to be ground. The material used consisted of 28 percent loam, 20% kaolin, 20% sintered kaolin, 23% quartz sand, 9% crushed glass. The specimens were sintered at 1,140 deg C and soaked for 2 hours. Tab 2

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USSR

UDC 536.521.3:533.9

GOGOLEV, N. L.

EMISSION SPECTRUM OF A TYPE EV-45 PULSED PLASMA SOURCE IN THE 230-1000 nm RANGE

TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYI NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII [Works of Metrological Institutes of the USSR. The All-Union Scientific Research Institute of Metrology] in Russian No 181(241), 1975 pp 25-27

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.1082 (résumé)]

[Text] A spectroscopic investigation is made of the emission of a condensed discharge in capillaries of organic materials: PTK textolite, VCh, polymethyl methacrylate, kaprolon and polyethylene. It is shown that the emission spectra of the discharge plasma in these materials in the 230-990 nm band are similar and contain a comparatively small number of absorption and emission lines. However, the presence of broadened absorption lines makes it difficult to extrapolate the brightness temperature of 39,100 K measured in the 500-644 nm region into the infrared band. From a table of spectral lines for the spectrum of the EV-45 source one may choose fairly broad

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USSR

GOGOLEV, N. L., TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYI NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII, No 181(241), 1975 pp 25-27

sections of the continuous spectrum that are free of spectral lines for purposes of calibration so as to use the EV-45 as a comparison source in plasma brightness pyrometry. Figure 1, references 7.

2/2

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USSR

UDC 621.793

GRIGOROV, A. I., TANANOV, A. I., FED'KO, YU. P., and SHTEYN, L. M. (Moscow)

CERTAIN PECULIARITIES OF STRUCTURE AND PROPERTIES OF COATINGS PRODUCED BY EXPLOSIVE SPRAYING

Moscow MASHINOVEDENIYE in Russian No 3, 76 pp 82-86 manuscript received 7 Jul 75

Abstract The explosive spraying method was used to coat pure aluminum oxide on Kh18N9T stainless steel and an aluminum oxide modified by chromium on a sintered aluminum alloy. Micro-x-ray spectral analysis was used to study the distribution of the elements in the transition zones between the coating and substrate. Friction tests were conducted on the coatings in order to ascertain the feasibility of using the so applied coatings as wear-resistant supports for the surfaces of gas bearings. After polishing, the coatings had thicknesses on the order of 100 microns. The microhardness of the aluminum oxide coatings was not under 1,000 - 1,100 kg/mm². Porosity fluctuated between 3 and 7%, and 1/2

USSR

GRIGOROV, A. I., TANANOV, A. I., FED'KO, YU. P., and SHTEYN, L. M., MASHINOVEDENIYE No 3, 76 pp 82-86

was reduced to 1-1.5% by refining the technology. The coefficients of friction for various temperatures and load cycles are plotted and show that this type of coating can be recommended for gas bearings. Ill 4 Bibl 5

2/2

USSR

UDC 539.621

KARAPETYAN, S. S., RUBTSOV, V. V., and SILIN, A. A. (Moscow)

EFFECT OF RADIATION ON THE LUBRICATION PROPERTIES OF MoS_2 IN A VACUUM AT LOW TEMPERATURES

Moscow MASHINOVEDENIYE in Russian No 2, 76 pp 84-85 Manuscript received 23 Aug 74

[Abstract] An attempt is made to discover whether when MoS_2 is cooled to $77-80^\circ\text{K}$ the effect of reduced surface tension should disappear as the energy of van de Waals attraction increases. The TNT-2 installation described by S. S. KARAPETYAN earlier (PROBLEMY TRENIYA I IZNASHIVANIYA -- Problems of Friction and Wear, No 2, 1973) was used for the experimental test. With liquid nitrogen the temperature was lowered to approximately 80°K in a vacuum of $5 \cdot 10^{-8}$ torr. Test radiation produced with an electron gun has a current density of 100 mA/cm^2 at 2 keV. An analysis of the results shows that radiation at normal temperatures reduced the coefficient of friction to 0.008 (limit of TNT-2 sensitivity). When the radiated specimen was cooled to 80°K the coefficient of friction of the unirradiated surface of the specimen increased to 0.039, i.e., approximately $1\frac{1}{2}$ times the room temperature value. Radiation of the surface

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USSR

KARAPETYAN, S. S., RUBTSOV, V. V., and SILIN, A. A.,
MASHINOVEDENIYE No 2, 76, pp 84-85

of MoS_2 cooled to 80°K produces only a reduction of friction to the level characteristic for room temperature, i.e., superlow friction is not observed in this case. Ill 1 Tab 1
Bibl 3

2/2

USSR

UDC 620.179.15/.16

NEKRASOV, S. A., SAPOTNITSKIY, M. S., RAZINKIN, V. I. and KOPYLOV, A. M.

COMPARATIVE ANALYSIS OF THE DETECTABILITY OF WELDING FLAWS IN ARTICLES OF Kh18N10T STAINLESS STEEL BY RADIOGRAPHIC AND ULTRASONIC INSPECTION METHODS

Moscow KOMPLEKSNAYA DEFECTOSKOPIYA SVARNYKH I PAYANNYKH SOYEDINENIY [Complex Flaw Detection of Welds and Soldered Joints, Collection of Works] in Russian, 1975 pp 78-81

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.198 by P. N. A.]

[Text] The paper gives the results of a study of welded specimens of Kh18N10T steel 8-25 mm thick. All welds underwent 100% radiography on the RUP-150/300-10-1 instrument. The flaws in the specimens were gas bubbles, slag inclusions and incomplete fusion. Cracks were artificially made in some specimens. The quality of the same specimens was checked on the UDM-3 flaw detector on working frequencies of 1.8, 2.5 and 5 MHz. The paper gives the results of comparison of the inspection of welded joints. Tables 2, references 2.

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USSR

UDC 531.781.2.087.92

BUL', N. K., SODOMTSEV, A. A.

INVESTIGATION OF THE ELASTICITY IMPERFECTIONS OF MATERIALS USED FOR MAKING THE ELASTIC ELEMENTS OF RESISTIVE STRAIN-GAGE SENSORS

TRUDY NAUCHNO-ISSLEDOVATEL'SKOGO I KONSTRUKTORSKOGO INSTITUTA ISPYTANIYA MASHIN, PRIBOROV I SREDSTV IZMERENIYA MASS [Works of the Scientific Research and Design Institute for Testing of Machines, Instruments and Facilities for Measuring Masses] in Russian No 5, 1975 pp 163-168

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.419]

[Text] The paper describes the results of investigation of imperfections in elasticity of 44 NKhtYu alloy and 35 KhGSA steel after various kinds of heat treatment. The residual deformations of these materials after application and removal of loads are calculated. The optimum heat treat schedules are presented that yield the best elastic properties on the investigated materials. Figures 2, tables 3, references 5.

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USSR

UDC 666.293

MAZO, E. E., Candidate of Technical Sciences, KHODSKIY, L. G., Candidate of Technical Sciences, ZHOS, F. T., Engineer, SIMKHOVICH, Z. I., Candidate of Technical Sciences, and PUCHKO, I. A., Engineer

INFLUENCE OF SITTALLIZATION ON THE CHEMICAL STABILITY OF ACID-RESISTANT
TITANIUM ENAMEL

Moscow STEKLO I KERAMIKA No 1, 76 pp 18-20

[Abstract] The use of sital coatings, long used as a means of increasing mechanical, thermal, and anticorrosion properties, shows promise for use in chemical equipment, and is now at the stage of industrial acceptance. The chemical stability of glass and sital coatings over a titanium-containing enamel base is discussed. It is found that the sital coatings have a higher stability to the effects of acids and transition media (acid-alkali). The stability of alkali of sital coatings is lower than that of glass coatings. The sital coating on the titanium enamel base provides better stability to acids than other forms of sital coatings. X-ray and electron microscope examinations of the coatings are interpreted. Ill 3

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USSR

UDC 621.922.025.004.6:621.923:669.14

SAMSONOV, G. V., Corresponding Member of the Ukrainian SSR Academy of Sciences, LIKHOLAT, I. G. and KISELEV, O. G., Engineers, Institute of Problems of Materials Research, Ukrainian SSR Academy of Sciences, Kiev Plant "Bol'shevik", Zaporozhe Titanium-Magnesium Combine

INVESTIGATION OF THE WEAR OF ABRASIVE GRAINS OF TRANSITION METAL
CARBIDES IN THE POLISHING OF STEEL

Kiev TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 4, 1976 pp 32-33 manuscript received 10 Feb 75

[Abstract] Materials commonly used as abrasives to polish iron and its alloys are either insufficiently strong or are too expensive. This article is concerned with a study of the materials, including titanium carbide, tungsten carbide, white electrocorundum and synthetic diamond. The experiments revealed that titanium carbide has the same productivity as synthetic diamond. Since the titanium carbide has maximal wear resistance it can be recommended for finish treatment of steels. References 3: 3 Russian.

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USSR

UDC 621.793.8

KULYBA, N. A., Candidate of Technical Sciences and REVA, A. T., Engineer, Zhitomir Branch of the Kiev Polytechnic Institute

USE OF DIFFUSION COATINGS OF TITANIUM CARBIDE

Kiev TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 3, 1976 pp 29-32 manuscript received 21 Apr 75

[Abstract] One of the greatest problems today is the protection of parts from interacting with liquid metals. In this respect titanium carbide is a very promising material. This article is concerned with an investigation on depositing titanium carbide diffusion coatings on various materials employing a gas method of depositing coatings of refractory compounds at lowered pressure using carbon tetrachloride. The authors give recommendations for using titanium carbide diffusion coatings. Figure 1.

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USSR

UDC 669.71:620.198

MARCHENKO, N. A., Doctor of Technical Sciences, LIPKO, S. KH, Candidate of Technical Sciences and LUKASHCHUK, YU. P., Khar'kov Polytechnic Institute

RAISING THE PROTECTIVE PROPERTIES OF ALUMINUM OXIDE FILMS

Kiev TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 2, 1976 pp 48-49 manuscript received 17 Sep 75

[Abstract] This paper discusses the possibility of improving the protective properties of oxide films by introducing organic surface-active substances into the sulfuric acid anodizing electrolyte and solutions for impregnating the films. It was found that the most effective method is the use of polypeptides for the impregnation solution. The protective capability of films about 50 micrometers in thickness produced in a sulfuric acid solution without additives and impregnated in a solution of polypeptides with a concentration of 10 g/l at a temperature of 100° C for 10 minutes is roughly three times that of films impregnated by standard methods. Figures 3.

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USSR

UDC 669.293

PROKOSHKIN, D. A., ARZAMASOV, V. B. and VASIL'YEVA, YE. V.

INFLUENCE OF CARBON ON THE ELASTIC PROPERTIES OF NIOBIUM

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 4, 76 pp 110-112
manuscript received 29 Apr 75

[Abstract] A study is made of the influence of carbon on the elastic properties of a multicomponent niobium alloy of the system Nb-Mo-Ti-Zr-C at room and elevated (200-800°C) temperatures. For the study of the elastic characteristics of the alloy NM15T3TSU (15% Mo; 3% Ti; 1% Zr; 0.05-0.03%C) a ribbon was prepared from which the elastic elements were made in the form of flat springs 0.3 x 5 x 100 mm in size. The tests show that carbon in amounts of 0.10-0.20% by weight increases both the modulus and limit of elasticity in the alloy at both room and elevated temperatures. Ill 3 Tab 1 Bibl 3

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USSR

UDC 539.214:539.374

SHVAIKO, N.Yu., MAKARENKOV, A.G., GASHKO, A.L., STEPANENKO, V.F., TONKONozHENKO, A.M., and CHERNYAKOV, Yu.A., Dnepropetrovsk State University

APPLICABILITY LIMITS OF THE THEORY OF SMALL ELASTOPLASTIC STRAINS RELATIVE TO THE VT-6S TITANIUM ALLOY UNDER A NONPROPORTIONAL LOADING

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 2, Feb 76 pp 48-53 manuscript received 11 Jul 74

Abstract The theory of small elastoplastic strains applicable to anisotropically hardening linear planar-plastic materials, based on a critical angle between the loading vector and tangents to the loading trajectory at every point of the latter (in the five-dimensional Il'yushin space) beyond the elastic range, was checked experimentally for the high-strength grade VT-6S titanium alloy. Tubular specimens were loaded in tension, in simple torsion, and in alternating torsion up to 90% of the ultimate stress level, at strain rates within $0.5-1.0 \cdot 10^{-5} \text{ sec}^{-1}$ so as to simulate quasiequilibrium processes. The specimens were loaded either initially in axial tension alone to above the elastic tensile limit and subsequently in tension with torsion, or initially in torsion alone to above the elastic shear limit and subsequently in torsion with tension. On the basis of the stress-strain curves plotted from test data, the theory of small elastoplastic strains was found to apply here within limits established by the monotonic-loading theorem with the appropriate form of the hardening function, but not quite within the limits established by the Budyanskii criterion involving the moduli of elasticity. Figures 3; references 10: all Russian.

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USSR

UDC 666.3 + 669.14: 621.792

SERGEYEV, A. V. and KAZAKOV, N. F.

FEMALE UF-46 CERAMIC JOINT WITH KH18N10T STEEL

Moscow STEKLO I KERAMIKA in Russian No 4, 76 pp 27-29

[Abstract] A description is given of mating a UF-46 ceramic female joint with a KH18N10T steel male joint by using a 40-50-micron copper interlayer and utilizing the difference in the temperature coefficients of linear expansion of the two materials. The design peculiarities and the technology of applying the copper coating to the ceramic and steel are described. The main parameters for the production of the joints and possibilities of their use are discussed. Ill 2

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USSR

UDC 691.327: 666.972.52

GINZBURG, TS. G., LITVINOVA, R. YE. and BORISOV, A. A.

HIGH-STRENGTH CONCRETE IN HYDRAULIC ENGINEERING CONSTRUCTION

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO, No 3, 76, pp 25-26

[Abstract] For nonmassive hydraulic engineering construction the high-strength concrete must have a strength rating of 400-500 kg/cm², use high-alite cement in the M400-M500 class that contains at least 55-65% C₃S, and a water requirement of not over 26%. Massive structures, besides the required temperature control during pouring and curing, should make use of an M500-class cement with alite content not over 48-50%, which only certain cement factories can supply. Careful selection of the size and mix of aggregates is important; the maximum feasible number of fractions of aggregates should be used.

Tab 3

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USSR

UDC 691.175:699.82:627.844

VEREZEMSKAYA, N. A., KARABAN, V. M., MILIN, A. M., MURZAK, A. D., and
SAKHAROV, V. I.

POLYMER WATERPROOFING OF INNER SURFACES OF THE FEED WATER PASSAGES OF THE
DNIEPER-II HYDROELECTRIC POWER STATION

Moscow GIDROTECHNICHESKOYE STROITEL'STVO No 3, 76 pp 11-16

[Abstract] The experience gained in applications operations and performance of epoxy-coal tar coatings as waterproofing for the linings of delivery water passages is described. The effectiveness of the waterproofing depends not only on the type of material but also on the manner in which it is applied. The selection and properties of materials and method of application are described. The use of the epoxy-coal tar waterproofing provides savings of costs and labor over the conventional use of asphalt mats. Ill 2 Tab 6 Bibl 4

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USSR

UDC 629.78.002.3

KRIGER, R. B. In: Sbornik Tekhnologiya izgotovleniya kleyenykh konstruktsiy
[Collection. Technology of Bonded Constructions] in Russian Moscow, Mir, 1975,
pp 234-251

RESISTANCE OF ADHESIVE BONDS OF ALUMINUM ALLOYS TO THE EFFECT OF SALT SPRAY

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 65 Abstract No 5.41.163
by A. V. U.]

[Abstract] The resistance of four aluminum alloy joints to the effects of a medium are investigated. Factors that affect the stability of adhesive bonds, the nature of metal surface preparation, the chemical nature of the adhesive, and the metallurgical state of the substrate are analyzed. Results are given on the strength of test specimens exposed to salt spray in a chamber (20% salt solution). Tables 4; reference 1.

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USSR

UDC 629.78.002.3

ESKIN, E. A., VENGZHAN, V. V., and FEDCHUK, V. K., Kosmicheskiye issledovaniya na Ukraine. Resp. mezhved. sb [Space Research in the Ukraine. Republican Interdepartmental Collection] in Russian 1975 No 6, pp 25-29

EFFECT OF TEMPERATURE AND HEATING RATE ON THE PHYSICAL-MECHANICAL PROPERTIES OF REINFORCED PLASTICS

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.165]

[Abstract] Results are given of an experimental investigation of the effect of temperature and rate of heating on the strength and deformability of asbestos textolite VTU UKhP 183-60 and fiberglass textolite SSTF under compression. It is shown that the deformability and strength of reinforced plastics depends significantly on both temperature and on the rate of heating. Results of the investigation are given on the temperature dependent variation in dimensions of specimens for three heat loading rates. Resume

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USSR

UDC 629.78.0023

KELLI, U. T. In: sb Tekhnologiya izgotovleniya kleyenykh konstruktsiy [Collection. Technology of Preparing Bonded and Bolted Constructions] in Russian Moscow, Mir, 1975 pp 190-201

DEVELOPMENT OF OPTIMUM JOINTS USING CARBON-FILLED PLASTICS OF THE CARBOFORM TYPE

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41.166 by A. V. U.]

[Abstract] Bonded and bolted joints of composition materials are investigated. Studies were made of titanium alloy joints with material consisting of high-strength carbon fiber and epoxy resin as the adhesive. In the sample bolted joints the distances between the holes and the ends of the lap, the length of the lap, and the width of the sample were varied. The bonded samples had various lengths and widths of overlap, and single and double gusset plates of titanium alloy. Before bonding, the samples were subjected to sand blasting. Test results are given for the tensile strength of the sample joints. Figures 5; tables 3; references 3.

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USSR

UDC 536.5.081

AMBROK, G. S., GODOVAN', YE. S., KOROLEVA, YE. A. and LAPINA, E. S.

METHODS AND EQUIPMENT FOR MAKING A TEMPERATURE SCALE CORRESPONDING TO THERMAL EMISSION OVER A WIDE SPECTRAL RANGE

Krasnodar MATERIALY TRET'YEGO VSESOYUZNOGO SOVESHCHANIYA PO LUCHISTOMU TEPL-OBMENU [Materials of the Third All-Union Conference on Radiative Heat Exchange] in Russian, 1975 pp 125-131

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.786 by V. L. M.-B.]

[Text] The International Practical Temperature Scale (IPTS) has been reproduced and transmitted at the All-Union Scientific Research Institute of Metrology imeni D. I. Mendeleyev in the spectral range from 470 to 1000 nm [sic] by the method of optical pyrometry by means of precision photoelectric brightness spectropyrometers. It is pointed out that the temperature range needs to be extended in the low-temperature and high-temperature regions, which can be accomplished by expanding the temperature scale into the UV and IR regions of the spectrum. The paper gives descriptions and characteristics of a spectropyrometer and auxiliary equipment developed at the Institute of

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USSR

AMBROK, G. S., GODOVAN', YE. S., KOROLEVA, YE. A. and LAPINA, E. S., MATERIALY TRET'YEGO VSESOYUZNOGO SOVESHCHANIYA PO LUCHISTOMU TEPL-OBMENU, 1975 pp 125-131

Metrology for making a temperature scale in the near-ultraviolet region of the spectrum. Certification has been granted for the IKP-57 IR spectrometer developed by the Khar'kov State Scientific Research Institute of Metrology and improved at the Institute of Metrology imeni Mendeleyev. Research has shown that temperature measurement errors in the 400-1500°C range are from 3 to 5 K with respect to brightness temperature, and from 10 to 15 K with respect to color temperature. The IPTS will be reproduced by black-body models for which the temperature can be determined not only by thermocouple, but also by the method of comparison with a reference temperature tube calibrated for brightness temperature in the visible region of the spectrum. A set of equipment consisting of spectropyrometers and laboratory emission sources of two types enables transmission of IPTS values for emission to a limit of 4.5 μm , and can be used for calibration and verification of brightness and color pyrometers operating in the infrared region of the spectrum. References 3.

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USSR

UDC 629.78.076.6

SHEKHOVTSOV, A.I.

METHOD OF MEASUREMENT PROCESSING WITH LIMITED INFORMATION ON THE
LAW OF DISTRIBUTION OF THE ERRORS

Moscow OPREDELENIYE DVIZHENIYA KOSMICH. APPARATOV (Determining
the Motion of Space Vehicles, Collection of Articles) in Russian
1975 pp 131-141

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76
Abstract No 2.41.77]

[Text] Author considers the problem of determining the parameters that minimize the maximum possible errors. It is assumed that the measurement errors are limited by modulus and arbitrarily correlated. It is shown that the method proposed for processing measurements affords the possibility of using all measurements without impairing the accuracy of the determination. Ill 3
Bibl 4

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USSR

UDC 681.325.3.088

BORTNYAKOV, YU. L. and IVANOV, A. S.

COMPUTING THE CHARACTERISTICS OF A/D BIT COMPENSATION

Moscow METROLOGIYA in Russian No 1, 1976 pp 14-19

[Abstract] On the basis of an expression obtained for the general case of the probability density distribution of A/D errors the authors examine the conversion of a mixture of measurable random quantity and additive conventionally independent noise. They obtain expressions for analyzing the A/D error characteristics based on the metrological characteristics. Table 1; figure 1; references 7: 7 Russian.

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USSR

UDC 528.56

ARNAUTOV, G. P., GIK, L. D., KALISH, YE. N., KORONKEVICH, V. P.,
MALYSHEV, I. S., STUS', YU.F. and TARASYUK, V. G.

MEASURING THE ABSOLUTE VALUE OF FREE FALL ACCELERATION BY THE
METHOD OF FREE FALL OF BODIES

Moscow METROLOGIYA in Russian No 2, 1976 pp 3-12

[Abstract] The authors describe a device for measuring the absolute value of free fall acceleration with an error no greater than $(2-3) \cdot 10^{-7}$ m/s². They investigate systematic and random errors in the measurement and describe a way to decrease them. They cite the experimental results. Table 1; figures 2; references 8: 5 Russian, 3 Western.

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USSR

UDC 539.374.082.4

BATUYEV, V. G., GORLOVSKIY, V. A., KONSTANTINOV, V. A. and DYKOV,
YU. I.

MEASURING THE SPECTRA OF SIGNALS OF ACOUSTICAL EMISSION DURING
THE PLASTIC DEFORMATION OF SAMPLES

Moscow METROLOGIYA in Russian No 2, 1976 pp 38-42

[Abstract] The authors demonstrate that the process of emission on the area of yield of certain structural materials (low and moderate carbon steels) can be assumed a stationary one and that one can use analyzers of serial or parallel type having both a quadratic detector and a detector of mean-rectified values. They mention that the use of the latter is more desirable in view of the significant increase in the dynamic measurement range. Figures 2; references 2: 2 Russian.

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USSR

UDC 681.2.089.6:681.3

DUBOV, B. S. and KOPYTIN, N. M.

COMPUTER UTILIZATION FOR METROLOGICAL CERTIFICATION OF MEASUREMENT TOOLS

Moscow METROLOGIYA in Russian No 3, 1976 pp 13-19

[Abstract] The authors propose using a computer to classify measurement tools by designation. They give a table of metrological characteristics which are normalized by measurement-tool groups. They demonstrate that each measurement-tool calibration can be studied as one realization of a random function. The procedure of information processing is studied. Table 1; references 5: 5 Russian.

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USSR

UDC 681.2.08-52

SIMONOV, N. M.

METHODS OF IDENTIFICATION FOR AUTOMATING DYNAMIC MEASUREMENTS AND DETERMINING THE DYNAMIC CHARACTERISTICS OF MEASUREMENT TOOLS

Moscow METROLOGIYA in Russian No 3, 1976 pp 24-29

[Abstract] The author is concerned with identification methods in making dynamic measurements and determining the dynamic characteristics of measurement tools. He suggests normalizing the transfer function, i. e., the coefficients of the differential equation which describes the behavior of the instrument. He recommends the use of approximate inverse models for automatic processing of the dynamic measurement results. Figures 3; references 4: 4 Russian.

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USSR

UDC 621.317.757:621.374.5

LIMONOV, A. S. and PERETYAGIN, I. V.

MEASUREMENT OF NONLINEARITY OF THE DISPERSION CHARACTERISTICS OF
DELAY LINES

Moscow METROLOGIYA in Russian No 4, 1976 pp 70-74

[Abstract] The authors are concerned with measuring the nonlinearity of delay line dispersion characteristics. They examine a device which ensures a high degree of accuracy and automation of the process of measuring the nonlinearities of delay line dispersion characteristics. In this device they use the method of differentiation of the voltage of the impulse characteristic of the dispersion delay line to be measured. The accuracy of the measurement will be substantially raised if a more sensitive phasometer is used. Figures 2; references 4: 4 Russian.

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USSR

UDC [551.465.15+551.511.6]:535.3

BAKUT, P. A., SVIRIDOV, K. N. and TROITSKIY, I. N.

MEASUREMENT OF THE STATISTICAL PARAMETERS OF TURBULENT MEDIA BY
OPTICAL METHODS

Moscow METROLOGIYA in Russian No 6, 1976 pp 40-45

[Abstract] The authors suggest a method of measuring the statistical parameters of turbulent media by short exposure registration of the diffraction pattern of a point quasi-monochromatic light source. They find an expression for the mean quadratic shift in the coordinate of the center of gravity of the pattern σ^2_0 and investigate its dependence on the statistical parameters of the turbulent medium. They describe the procedure used to measure the statistical parameters of a turbulent medium according to the measured values of σ^2_0 . Figure 1; table 1; references 3: 1 Russian, 2 Western.

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USSR

UDC 536.521

ROZHDESTVENSKIY, A. V.

CONCERNING SEVERAL POSSIBILITIES OF MULTISPECTRAL PYROMETRY

Moscow METROLOGIYA in Russian No 6, 1976 pp 45-48

[Abstract] The author examines the possibility of using multispectral pyrometry for increasing the accuracy of measuring temperature by an optical method. He demonstrates the possibility of measuring the true temperature for a predetermined form of the dependence of spectral emittance on wavelength by a rational selection of the number and size of the effective wavelengths.

References 6: 6 Russian.

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USSR

UDC 621.317.341.3:621.396.833.1

GLUSHCHENKO, S. S., NARBUT, V. P. and SHVETS, V. I.

DETERMINATION OF THE COEFFICIENT OF REFLECTION OF ANTENNA FAIRINGS

Moscow METROLOGIYA in Russian No 6, 1976 pp 70-74

[Abstract] The authors state that available methods of determining the coefficient of reflection for a conventional angle of incidence of electromagnetic energy on a wall are used only for flat dielectric walls, and since the walls of real fairings are not flat but have a curvilinear surface, then the use of these methods leads to large errors in measuring small coefficients of reflection. They suggest a method of determining the coefficient of reflection which takes into account the real shape of the fairing wall with a known antenna placement under the fairing. Using an example of a cylindrical fairing with a given placement of the point antenna under the fairing they discuss a method of determining the coefficient of reflection which may be extended to other shapes of antenna fairings as well. Figures 2; references 1: 1 Russian.

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USSR

UDC 621.318.124:538.22

GLAGOLEV, S. F. and CHERVINSKIY, M. M.

INVESTIGATION OF THE SYSTEMATIC ERROR IN DETERMINATION OF THE MAGNETIC CHARACTERISTICS OF A FERROMAGNETIC BY THE MAGNETO-OPTICAL METHOD

TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNIY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII [Works of Metrological Institutes of the USSR. The All-Union Scientific Research Institute of Metrology] in Russian No 180(240), 1975 pp 68-73

[From REFERATIVNIY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.1265]

[Text] An analysis is made of the operation of a magnetopolarimeter for determining the magnetic characteristics of thin magnetic films. It is shown for the first time that the magneto-optical signal registered during quasi-static magnetic alternation contains a nonlinear term, showing the contribution of rotation of the magnetization vector to the process of magnetic alternation. The nonlinear term should be treated as a systematic error in recording the hysteresis loop. Elimination of this error is achieved by using a two-beam magnetopolarimeter system, or by using modulation with respect to azimuth of the polarization plane. References 4.

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USSR

UDC 519.25:088:531.72

ZHULEV, V. I. and SADOVSKIY, G. A.

MEASUREMENT AND ANALYSIS OF EMISSION AREAS OF RANDOM PROCESSES

Ryazan' INFORMATSIONNO-IZMERITEL'NAYA TEKHNIKA [Information-Measurement Technology, Collection of Works] in Russian No 1, 1975 pp 18-23

[From REFERATIVNIY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.64]

[Text] An investigation is made of the systematic error in measuring the area of emissions by a discrete sampling method. Computational relations are presented that enable selection of the necessary frequency of quantization of the investigated process. A description is given of the principle of construction of a digital multichannel analyzer of areas of emissions. References 3.

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USSR

UDC 531.719.2.089.6

SARVIN, A. A.

A METHOD OF GRADUATING RANGE FINDERS FOR SMALL DISTANCES WITH A NONLINEAR SCALE

Leningrad OPTIKO-MEKHANICHESKOYE PRIBOROSTROYENIYE [Opticomechanical Instrument Making, Collection of Works] in Russian No 1, Leningrad University, 1974(1975) pp 121-125

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.340 (résumé)]

[Text] A method is proposed for graduating the nonlinear distance scale for short distances on a range finder by using a geodetic comparator supplemented by a device for setting distances within meter intervals. The technique is based on using special mathematical processing of the measurement results to find the real function from the experimental one, assuming that the law of variation of the function is known as well as individual points through which it passes.

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USSR

UDC 531.717.14

LEBEDYANSKAYA, N. D. and FILATOV, K. G.

MODERN METHODS OF CHECKING FOR CLEARANCE IN PRECISION CYLINDRICAL JOINTS OF THE PLUNGER AND SLIDE VALVE COUPLE TYPE

(TRUDY) MOSKOVSKOGO AVIATSIONNOGO INSTITUTA [(Works) of Moscow Aviation Institute] in Russian No 328, 1975 pp 61-69

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.359 by P. N. A.]

[Text] Extremely close clearance in a precision joint is assured by assembly in the group interchangeability method, or by selection and simultaneous finishing of the parts to be joined. A selection process based on comparing the results of measurement of the diameters of the separate parts to be joined (with accuracy to parts of a μm) is very labor consuming. A survey is given of modern methods of checking clearances that are used in Soviet and non-Soviet machine building. A description is given of a universal measurement installation that has been developed, on which one may measure parts, check clearances or select precision pairs (for required clearance) 6-30 mm in diameter and up to 150 mm long. References 4.

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USSR

UDC 681.113.92

GENDEL'MAN, L. S.

AUTOMATIC CORRECTION OF CHRONOMETER READINGS WHEN MAKING OPTICAL OBSERVATIONS

Leningrad OPTIKO-MEKHANICHESKOYE PRIBOROSTROYENIYE [Opticomechanical Instrument Making, Collection of Works] in Russian No 1, Leningrad University, 1974(1975) pp 147-151

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKNIKA No 3, 1976 Abstract No 3.32.626 (résumé)]

[Text] A method is described for automatic correction of chronometer readings in accordance with the radio signals sent out each second by the Soviet Time Service using a discrete phasing technique. An investigation is made of the error structure of a chronometer with correction, and the method of calculating the error is presented. Recommendations are made on error reduction.

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USSR

UDC 536.521.089.6:535.241.3

OSCHARINA, L. I.

INFLUENCE OF EXTERNAL CONDITIONS ON THE GRADUATION CHARACTERISTICS OF TEMPERATURE TUBES

TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII [Works of Metrological Institutes of the USSR. The All-Union Scientific Research Institute of Metrology] in Russian No 181(241), 1975 pp 23-24

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKNIKA No 3, 1976 Abstract No 3.32.930]

[Text] The paper gives comparative data on the influence that external conditions have on the graduation characteristics of Soviet series-produced emitters -- gas-filled temperature tubes type SI10-300 used for metrological and other purposes in the field of optical pyrometry, and vacuum filament tubes based on them. The results of studies show the feasibility of improving accuracy of metrological work by using vacuum temperature tubes in place of gas-filled tubes in a limited temperature range, and also demonstrate the timeliness of development and production of new Soviet temperature tubes in two versions -- gas-filled and vacuum. References 4.

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USSR

UDC 536.3.001.2

SAAKYAN, M. B.

DETERMINATION OF THE INTERNAL CHARACTERISTICS OF EMISSION FORMED BY A
V-SHAPED CAVITY

IZVESTIYA SEVERO-KAVKAZSKOGO NAUCHNOGO TSENTRA VYSSHEY SHKOLY. SERIYA TEKH-
NICHESKIKH NAUK [Bulletin of the North Caucasus Science Center for Advanced
Studies. Technical Science Series] in Russian No 3, 1975 pp 85-87

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976
Abstract No 3.32.1049 (résumé)]

[Text] The paper gives an application of Professor Yu. A. Surinov's new
numerical method for approximate solution of integral equations of emission
to determination of the spatial density of incident emission $n_{inc}(M)$ (or the
volumetric density of radiant energy $U(M)$) and the spherical emission vector
 $E_{4\pi}(M)$ at internal points of the emission field formed by a V-shaped cavity.
The author derives compact computational formulas and expressions for de-
termining and studying the corresponding scalar and vector quantities that
are important in heat engineering. References 10.

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USSR

UDC 621.317.42

BUBER, V. B. and VASIL'YEV, V. V.

ON SOME CHARACTERISTICS OF A PHASE-SENSITIVE FARADAY MAGNETIC FIELD PICKUP

Moscow PROBLEMY FIZIKI OPTIKI I METROLOGII [Problems in the Physics of Optics
and Metrology, Collection of Works] in Russian, 1976 pp 35-37

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976
Abstract No 3.32.1488]

[Text] The proposed method of making linear magneto-optical and electro-
optical field sensors is based on a frequency detection principle that gives
direct information on the signal phase which is proportional to the field
being measured. The proposed method of measuring electric and magnetic fields
has higher resistance to interference than conventional methods since it
combines the advantages of using optical methods with angle modulation.

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USSR

UDC 531.71:531.76:531.781.082.7

GRINMAN, I. G., BAKHTAYEV, SH. A. and SEMENOV, S. YU., Institute of Metallurgy and Enrichment, Academy of Sciences Kazakh SSR

MAGNETIC METHODS OF CHECKING THE PARAMETERS OF A MOVING WIRE

Alma-Ata MAGNITNYYE METODY KONTROL'YA PARAMETROV DVIZHUSHCHEYSYA PROVOLOKI in Russian, 1975, 14 pp (manuscript deposited in VINITI 22 Dec 75, No 3744-75 Dep.)

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1975 Abstract No 4.32.336 DEP]

[Text] The paper describes methods of measuring the length, speed of motion and tension of a steel wire by using magnetic markers. An instrument is described for measuring the length of steel wires with registration of the result in digital form. The magnetic markers are applied to the wire at equal distances regardless of the speed of motion since a new mark is recorded when the preceding one is reproduced. The total number is then counted by a pulse counter. The device can be set to stop the production process when a given length is reached. The instrument measures lengths to 10^6 m with an error of 0.1%. Since measurement accuracy exceeds existing figures by a factor of more than 100, the devices could result in considerable savings when introduced. References 4.

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USSR

UDC 543.257.2

LEVCHENKO, YU. N., MALKOVA, E. M. and TSARAPKINA, L. A.

STANDARD POTENTIAL OF A CHLORINE-SILVER ELECTRODE IN WATER-ETHANOL SYSTEMS THAT CONTAIN MORE THAN 50% ETHANOL

TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII [Works of Metrological Institutes of the USSR. The All-Union Scientific Research Institute of Metrology] in Russian No 161(221), 1975 pp 28-38

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.1045 (résumé)]

[Text] The paper presents the results of determination of the potential of a chlorine-silver electrode E° in systems containing 50, 70 and 90% ethanol (by mass) at temperatures of 25, 35 and 40°C. Optimum conditions are established for carrying out the experiment, and rules are given for preparing the solutions and the electrodes, as well as for calculating E° . A metrological evaluation of the results is presented. Figure 1, tables 6, references 19.

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TOLOKNOVSKIY, V. R., YAKUPOV, R. G. and BONDAREVA, Z. D.

INFLUENCE OF MEASUREMENT ERRORS ON THE TECHNICAL-ECONOMIC INDICES OF SERIAL
TURBOJET ENGINE TESTS

Ufa ISPYTANIYE AVIATSIONNYKH DVIGATELEY [Aircraft Engine Testing, Collection
of Works] in Russian No 2, 1974 pp 115-118

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 1, 1976
Abstract No 1.34.104 (résumé)]

[Text] An examination is made of the problem of evaluating the economic effectiveness of introducing new measurement equipment on test stands in plants, and a procedure is given for determining economic effectiveness. The technique is based on the method of finding the principal characteristics of production before testing and the characteristics of the tests themselves when two different (old and new) types of measurement systems are used. Figures 5, references 3.

1/1

EAST GERMANY

HAGE, H.-J., Dr of engineering, and HELM, H.-M., candidate of engineering sciences, Dresden Technical University, Information Engineering Section, Communications and Metrology Area, Dresden

NON-STATIONARY RESONATOR BEHAVIOR

East Berlin FEINGERAETETECHNIK in German Vol 25 No 1, Jan 76 pp 19-22

[Abstract] If the pass-through time (during which the sliding frequency in the sliding-sine test method passes through the resonance bandwidth) equals or is less than the rise time, a resonator will become non-stationary. The setting of the pass-through time in test methods is therefore important. This article describes a method for its determination, based on the response envelope curve. The method of determination was used with the test method specified in East-German Standard TGL 200-0057 and was found to be useful. It was also found that in the critical lower frequency range there is practically no difference between stationary and non-stationary operation. Figures 7; references 5: 1 Russian and 4 German.

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USSR

UDC 534.1

BABITSKIY, V. I., and TRESVYATSKIY, A. N. (Moscow)

FORCED OSCILLATIONS OF A BEAM WITH ELASTOPLASTIC DISSIPATIONS OF ENERGY AND MASS AT THE END HELD BETWEEN RESTRAINTS

Moscow MASHINOVEDENIYE No 2, 76 pp 16-23 in Russian manuscript received 2 Jul 75

[Abstract] Studies of the bending oscillations of rotating shafts, accounting for impacts in the bearings, studies of certain opticommechanical scanning systems, and the analysis of contacting and switching devices are reduced to the study of the resonance phenomena in a cantilevered elastoplastic beam with mass at the end that is held between rigid restraints. The system is an elastoplastic beam of finite length that is rigidly restrained at one end and carrying at the free end a pulsating mass situated in a position of static equilibrium with a given gap between the two fixed, symmetrically elastic restraints. The beam undergoes bending oscillations under the effect of a transverse force applied at a given cross section, whereby the vibrating mass

1/2

USSR

BABITSKIY, V. I., and TRESVYATSKIY, A. N., MASHINOVEDENIYE, No 2, 76 pp 16-23

interacts with the elastic restraints with given rigidity. This work uses the method of harmonic linearization to study the qualitative aspects of these resonance phenomena. Plotted amplitude-frequency characteristics of the impact mass show nonuniform nonlinear effects in the system as a result of impact interactions. Ill 4 Bibl 4

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USSR

UDC 620.191.33

VOLKOV, V. M.

ON THE THEORY OF THE SUBCRITICAL DEVELOPMENT OF FATIGUE CRACKS IN THE ELEMENTS OF THIN-WALLED STRUCTURES

Moscow MASHINOVEDENIYE in Russian No 3, 76 pp 67-73 manuscript received 27 Jun 75, revised 5 Nov 75

[Abstract] The author presents a theory of quasi-brittle, spasmodic subcritical development of fatigue cracks. The theory is based on the kinetic equations for disintegration and on certain experimental findings on the behavior of the elements of metallic structures with cracks. An analysis is made of the conditions of equilibrium and subcritical development of cracks for the continuous and cyclic loading of structures, as well as of the formation of "sedentary" fatigue cracks. A relationship is established between the constants entered into the equations for the mean rate of growth of the cracks and the strength, viscosity, and plastic characteristics of the metals. Problems of estimating the influence of the type of stress condition of the structure and residual effects in the material on the growth rate of the

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USSR

VOLKOV, V. M., MASHINOVEDENIYE No 3, 76 pp 67-73

fatigue cracks are considered. The hypotheses based on experimental facts regarding the behavior of metals under cyclic loading provide an empirical basis for a logical scheme of the phenomenological model of quasi-brittle subcritical fatigue-crack development in the elements of thin-walled structures. The established dependencies afford the possibility of computing the influence on the growth rate of the fatigue cracks by the stress amplitude, asymmetry of the load cycle, residual effects in the material and type of stress conditions.

Ill 2 Bibl 72

2/2

USSR

UDC 629.78.015.4

LIPIN, YE.K.

DESIGNING POWER PLANT STRUCTURES WITH MAXIMUM RIGIDITY

Moscow UCH.ZAP.TSENTR.AERO-GIDRODINAM.IN-TA (Scientific Notes of the Central Aerohydrodynamic Institute) in Russian Vol 6
No 4, 75 pp 126-129

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76
Abstract No 2.41.170]

[Text] A method is described for distributing a given total volume of material into elements of a complex thin-walled structure in compliance with the principle of minimum energy of deformation and satisfaction of the requirements of strength and rigidity for each of the elements making up the total structure.

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USSR

UDC 629.78.015.4

BADRUKHIN, YU. I., and GALKIN, S.I.

STABILITY OF A CYLINDRICAL SHELL OF VARYING THICKNESS UNDER VARYING EXTERNAL PRESSURE

Moscow UCH.ZAP.TSENTR.AERO-GIDRODINAM.IN-TA (Scientific Notes of the Central Aerohydrodynamic Institute) in Russian Vol 6
No 4, 75 pp 49-57

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 2, 76
Abstract No 2.41. 172]

[Text] In the proposed method of solving the problem of the stability of a cylindrical shell of varying thickness under external pressure a numerical study is made of the influence of the boundary conditions on the critical load. Example calculations are made for optimum shells having the highest critical load values for equivalent weight. Results of the calculations are compared with experimental data.

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VASILENKO, A.T., GRIGORENKO, Ya.M., and PANKRATOVA, N.D., Institute of Mechanics, Academy of Sciences UkrSSR, Kiev

ANALYSIS OF THE STATE OF STRESS OF NONCIRCULAR CYLINDRICAL SHELLS WITH LONGITUDINAL STIFFENERS

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 4, Apr 76 pp 117-121 manuscript received 25 Apr 75

[Abstract] A stress analysis is made of noncircular cylindrical shells with longitudinal stiffeners asymmetric relative to the coordinate surface, their width being assumed much larger than their height. The stiffener material may be elastically different than the shell material. The shell properties, mechanical as well as thermophysical and geometrical, may vary along the directrix either continuously or discretely. The shell is hinge supported at its ends and under both distributed and concentrated loads. The theory of thin shells yields here a system of differential equations describing the stress-strain field, their variables being separable by way of a Fourier-series expansion along the axial coordinate. The closedness of the shell surface and the periodicity of the solution reduce the problem to that of integrating a system of sixteenth-order ordinary differential equations, to be solved by a numerical method on a digital computer. Several solutions have been obtained for special cases such as a distributed load alone, concentrated loads alone, and an elliptic cylindrical shell. The effect of stiffeners on the state of stress has been found to be different under different loading modes. References 6: all Russian.

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PAIAMARCHUK, V.G. and POLYAKOV, P.S., Institute of Mechanics, Academy of Sciences UkrSSR, Kiev

EFFICIENT REINFORCEMENT OF AN INITIALLY DEFLECTED SHELL WITH STRINGERS

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 3, Mar 76 pp 21-27 manuscript received 18 Mar 75

[Abstract] A circular cylindrical shell of uniform thickness is considered with longitudinal reinforcements and initial deflections from its ideal form. This shell is under a compressive load uniformly distributed over the edges. The reinforcing stringers are joined to the shell so as to ensure equal linear and equal angular deflections along the contact lines. The determination of critical loads is treated as a problem geometrically nonlinear with respect to two unknown functions: deflection and stress. It is solved by the energy method, taking into account the discrete spacing of stringers. The initial deflection is approximated by a double trigonometric series. The deflection due to loading is approximated by a trigonometric binomial, one term of which reflects the state of stability in the linear sense and the other term reflects the tendency to buckling. The stress function satisfies certain boundary conditions and is found from the solution to the equation of strain continuity. The analytical results are compared with test data pertaining to a shell made of grade AMG-6M (aluminum alloy) strip by spot welding the seam and the stringers. Figures 1; Tables 1; references 3: all Russian.

1/1

USSR

UDC 539.3

SAVICHENKO, A.A., Institute of Mechanics, Academy of Sciences, UkrSSR, Kiev

EFFECT OF SHEARING STRAIN ON THE STATE OF STRESS OF A THREE-LAYER SPHERICAL SHELL REDUCED BY A HOLE

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 3, Mar 76 pp 47-54 manuscript received 7 Feb 75

[Abstract] A three-layer spherical shell is considered with the inner layer weaker in transverse shear than the two outer layers. A method is proposed for solving the problem of stress concentration around a circular hole due to an external normal load on the shell. The state of stress is described by general resolvent equations in terms of the Laplace operator in polar coordinates, the forces and the moments are expressed in terms of the resolvent functions and shear angles. The solution of this problem reduces to integrating the resolvent equations and satisfying the boundary conditions around the hole contour as well as around the outside shell surface. For the case of a uniform external pressure the solution is represented by the sum of three solutions to Helmholtz equations. In the case of a hole so far from the outer shell surface as to render the effect of the latter negligible, one of the three resolvent equations drops out. Numerical results indicate that the Kirchhoff-Love theory applies when the inner layer is stiff. The theory of three-layer shells with a filler must be applied when the inner layer is pliant, since not accounting for transverse shearing strains would result in an underestimation of stresses by possibly as much as 50%. Figures 4; references 7: 5 Russian, 2 Ukrainian.

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USSR

UDC 539.3

DASHCHENKO, A.F. and KOLYBIKHIN, Yu.D., Odessa Polytechnic Institute

TWISTING AN ORTHOTROPICALLY NONHOMOGENEOUS STRIP WITH TWO PUNCHES

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 3, Mar 76 pp 71-77 manuscript received 21 Jun 74

[Abstract] A strip of an infinitely large radius is considered with three planes of elastic symmetry and with each of its two shear moduli a function of the radial coordinate. This strip is twisted by two coaxial punches of different radii. The problem is to determine the only nonzero component of the displacement vector in cylindrical coordinates which will satisfy the resolvent differential equation with appropriate boundary conditions, the latter reducible to paired integral equations and further to Fredholm integral equations of the first kind. The solution is found in terms of contact-stress functions by the method of orthogonal polynomials. On the basis of numerical results for three different special cases, this method is analyzed for convergence and the relative effects of the various punch parameters. The results agree with those obtained by other authors, closely within 1%. Figures 3; Tables 1; references 7: all Russian.

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USSR

UDC 539.3:534.231.1

SABODASH, P.F., Moscow

IMPACT OF A VARIABLE-SECTION COMPOUND BEAM AGAINST A STIFF BARRIER

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 3, Mar 76 pp 84-89 manuscript received 10 Jul 74

[Abstract] The one-dimensional linear dynamic theory of elasticity is applied to the problem of collision between a compound beam moving at a constant axial velocity and a perfectly stiff stationary barrier. The beam is of finite length and consists of one segment with a uniform cross section followed by another segment with a linearly variable cross section, the acoustic stiffness of the former being much higher than that of the latter. The exact analytical solution to the fundamental system of two second-order partial differential equations is found by means of a unilateral Laplace transformation with respect to time, taking into account both incident and multiply reflected plane waves. The effect of physical and geometrical parameters on the contact stress and its variation is analyzed numerically. At time zero only the physical properties of the material determine the contact stress. A larger difference between the acoustic stiffnesses of the two beam segments reduces the contact stress, while a smaller taper of the variable-section segment increases its amplitude. The stress reverses from compressive to tensile, after the beam has rebounded from the barrier and continues to move freely. Figures 2; references 4: 3 Russian, 1 Western.

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USSR

UDC 621.83

EIDINOV, M.S., NYRKO, N.A., EIDINOV, R.M., and GASHUKOV, V.S., Ural Polytechnic Institute, Sverdlovsk

TORSIONAL VIBRATIONS OF A SYSTEM WITH A HOOKIAN COUPLING

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 3, Mar 76 pp 98-106 manuscript received 11 Jun 74

[Abstract] Torsional vibrations of a system with a Hookian coupling between driver and follower are analyzed in terms of a nonlinear dynamic model and by asymptotic methods. The differential equations of motion are solved in the first approximation, whereupon the system is analyzed in the phase plane for stability and instability regions with respect to the fundamental two resonance modes. Figures 5; references 8: 6 Russian, 1 East German, 1 Western.

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KHOROSHUN, L.P., MELIKBEKYAN, A.Kh., and PINCHUK, V.M., Institute of Mechanics, Academy of Sciences UkrSSR, Kiev; Voroshilovgrad Institute of Machine Design

PREDICTING THE PROPERTIES OF DISORIENTED FIBROUS COMPOSITES

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 2, Feb 76 pp 13-19 manuscript received 29 Apr 75

[Abstract] A method is shown by which one could determine the macroelastic properties of materials with reinforcing fibers of arbitrary stochastically distributed spatial orientations. It is derived from the fundamental relation between the stress tensor and the strain tensor, with the tensor of elasticity moduli regarded as a random statistically homogeneous function of the space coordinates. Strain fluctuations are discounted in obtaining a system of two algebraic equations with respect to mean strains of the binder and of the fibers in every direction, weighted by the fiber concentrations and by the orientation probabilities respectively. These equations are solved here for two special cases, namely a uniform distribution and a partial disorientation over a finite solid angle. Figures 6; references 3: all Russian.

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BORISENKO, V.A., GRINCHENKO, V.T., and ULITKO, A.F., Institute of Mechanics, Academy of Sciences UkrSSR, Kiev

ELECTROELASTICITY RELATIONS FOR PIEZOCERAMIC SHELLS OF REVOLUTION

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 2, Feb 76 pp 26-33 manuscript received 25 Mar 75

[Abstract] The solution to the coupled problem of electroelasticity is found for piezoceramic shells of revolution with a uniform thickness and prepolarized normally to the median surface. Within the accuracy of the Kirchhoff-Love hypotheses, the exact equations of the three-dimensional piezo effect are simplified, with the normal component of the electric field intensity varying linearly over the shell thickness and the normal component of the electric induction vector independent of the thickness. The resulting physical relations conform to the classical theory of thin elastic shells. Both electrical and mechanical constraints must be additionally established for every specific mode of loading. Under certain conditions, as when the electrodes cover the lateral surface completely and only the latter is loaded by a potential difference, the mechanical variables and the electrical variables appear separately in independent equations of displacement. Under different conditions, a rather simple solution to the coupled boundary-value problem for thin shells can still be obtained from known solutions in the theory of purely elastic shells. Figures 2; references 12: 8 Russian, 4 Western.

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USSR

UDC 678.539.3

GUZ', A. N. and LE MIN KHAN, Institute of Mechanics, Academy of Sciences UkrSSR, Kiev; Kiev State University

PROPAGATION OF WAVES IN COMPOSITE LAMINATE MATERIALS WITH LARGE INITIAL STRAINS

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 1, Jan 76 pp 3-11 manuscript received 25 Mar 75

[Abstract] The propagation of waves in composite laminate bodies is analyzed on the basis of the three-dimensional linearized finite(large)-strain theory of elasticity, with uniform initial stresses assumed in a structure consisting of alternate layers of two different materials. The analysis covers both compressible and incompressible bodies: starting from the natural state (all layers free of stresses and strains) in Lagrangian coordinates, through the initial state of stress and strain in Cartesian coordinates, to the state of perturbation. Each of the two component materials is regarded as nonlinearly elastic, the elastic potential being represented by arbitrary twice differentiable functions. The fundamental equations of the initial state are solved for the wave velocity and the surface forces, under load. Of special interest is the transverse propagation of waves, i.e., normally across the layers. Compressible and incompressible bodies are considered here, the latter case illustrated by a neo-Hookian solid. References 5: 4 Russian. 1 Western.

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USSR

UDC 533.6.013.122

VOL'MIR, A. S., NISHT, M. I., and PONOMAREV, A. T., Zhukovskii Military-Aircraft Engineering Academy, Moscow

NONLINEAR VIBRATIONS OF A PLATE AND A CYLINDRICAL PANEL IN A NONSTEADY STREAM WITH SEPARATION FLOW

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 1, Jan 76 pp 12-17 manuscript received 10 Jun 74

[Abstract] A problem in aeroelasticity, namely that of a deformable structure in a nonsteady stream with separation flow, is tackled by numerical methods. A thin wing of an infinite span is assumed moving in a stream of an ideal incompressible fluid. This motion is during the transient period accompanied by flow separation at sharp edges. The wing and its wake are fictitiously replaced by an array of discrete vortices, while the external stream is regarded as vortexfree. The aerodynamic part of the problem reduces to solving a system of algebraic equations, with asymmetry introduced by a tilting of the wing. The elasticity part of the problem reduces to solving a system of differential equations which describe large deflections of a panel system, with both corresponding mechanical strains and inertia forces taken into account. The solution is obtained, after transformation to finite-difference equations, with the aid of a digital computer. A typical example of a Duralumin wing is shown, to illustrate the possibility of transition from alternate jerks to "shaking" oscillations about the equilibrium position. Figures 7; references 4: 3 Russian, 1 Western.

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PODIL'CHUK, Yu. N. and PINDICH, A. A., Institute of Mechanics, Academy of Sciences UkrSSR, Kiev

STATE OF STRESS OF AN ELASTIC NONHOMOGENEOUS SPHERE WITH A CORE OF IDEAL FLUID

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 1, Jan 76 pp 18-24 manuscript received 11 Feb 75

[Abstract] The state of stress of the earth in the fields of gravitation and rotation is analyzed on the basis of the A. Gutenberg-Bullen model, which more accurately than any other model describes the actually measured natural oscillations. Accordingly, the earth is treated as an elastic nonhomogeneous sphere and fictitiously subdivided into m (34) concentric layers of uniform density around an inner core of ideal fluid. The general equations of equilibrium, with respect to displacements of the shell layers, are solved in Legendre's polynomials. First the stresses in a gravitating sphere, with central symmetry, and the pressure in the core are determined. Next the stresses in a rotating sphere are determined, at a constant angular speed. Combining both yields two sets of linear algebraic equations (68 and 136 for $m = 34$), which have been solved graphically. The results indicate that the rotational stresses either add to or subtract from the gravitational stresses an amount within $0.2-1.0 \cdot 10^8 \text{ N/m}^2$, which agrees with direct measurements. Figures 5; references 7: all Russian.

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KALININ, I. N., Gorkiy State University

A METHOD OF DESIGNING MINIMUM-WEIGHT SHELLS OF REVOLUTION

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 1, Jan 76 pp 44-50 manuscript received 22 May 74

[Abstract] An algorithm has been developed for minimizing the weight of reinforced shells of revolution. Given are: the geometry of the median surface, the load, the constraints, the physical properties of the material, and the number as well as the section moduli of the reinforcing ribs and stringers. The algorithm is derived from the solution to the reverse problem of optimizing the thickness profiles for given strength and minimum-weight requirements. The stringers are "distributed" elements of an orthotropic structure and the ribs are discrete elements assumed completely ineffective meridionally. The algorithm is suitable for computer programming with rather simple iterations. Its main advantage is that the volume of computations necessary for such an optimization of a bidirectionally reinforced shell does not depend on the number of variables. Figures 5; Tables 1; references 5: all Russian.

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USSR

UDC 539.3:534.11

MAKHORTYKH, ZH. K. (Moscow)

NATURAL OSCILLATIONS OF A BEAM WITH VARYING MASS AND RIGIDITY

Moscow MASHINOVEDENIYE in Russian No 1, 76 pp 44-47 manuscript received 6 Jan 74, revised 9 Oct 75

[Abstract] Author considers the problem of the natural oscillations of a beam whose mass and rigidity are functions of time. The problem is reduced to the solution of an ordinary differential equation with variable coefficients. For this equation a precise solution, expressed by a Bessel function, is obtained. The use of an asymptotic representation of the Bessel function affords the possibility of obtaining simple analytical dependencies of frequency and amplitude on time. It is shown that the results of the method may be used advantageously in the designing of locomotives and the trains of rolling mills. Ill 3 Bibl 6

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USSR

UDC 629.78.023.1054

KIYKO, I. A. Nauchnyye trudy instituta mekhaniki, Moskovskogo universiteta [Scientific Transactions of the Institute of Mechanics, Moscow University] in Russian 1976, 71 pages, figs. See also: A. I. Kiyko and A. T. Spiridonov, Ibid, No 38, pp 38-63. See also: A. I. Kiyko. Ibid, pp 16-18

PROPAGATION OF PERTURBATIONS IN ELASTIC AND NONELASTIC RODS AND SHELLS

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract Nos 5.41.126 K - 5.41.128 by T. A. YE]

[Abstract] Exact solutions are given and investigations are described for non-stationary wave processes in circular anisotropic cylinders and cones for the dispersion of waves in shells and in laminated viscous-elastic plates; the propagation of stress waves in a fluid-filled cylindrical shell is studied. Propagation processes are examined in one-dimensional waves in nonhomogenous elastic and viscous-elastic materials as well as in rods of varying thickness. Solutions are given for certain problems of developed plastic deformations in circular plates and spherical shells subjected to intense impulse loads; the size and shape of the residual bends are estimated.
3060

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USSR

UDC 629.78.015.4

SIRAZUTDINOV, YU. K. Trudy Kazanskogo aviatsionnogo instituta [Proceedings of the Kazan' Aviation Institute] in Russian 1975, No 189 pp 29-36

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE in Russian No 5, 76 Abstract No 5.41.133 Resume]

[Abstract] The problem of calculating statically determinate and indeterminate beams of the least volume and equal resistance to a longitudinal force, taking the beam weight into account, is solved. Integral equations are obtained for determining the total bending moment, accounting for the beam weight. These equations are solved by the successive approximation method. In several particular cases the solution of the equations may be represented in the form of the product of the moment of the external forces and some function $n(x)$, which for the basic types of loading may be calculated beforehand and represented in the form of graphs or tables. Examples of minimum volume beams of equal resistance are given. Figures 2; table 1; references 3.

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USSR

UDC 629.7.036.2:533.697.2

ZATOLOKA, V. V., ZVEGNITSEV, V. I. and SHUMSKIY, V. V.

INFLUENCE THAT COMPRESSION CHARACTERISTICS IN THE AIR COLLECTOR HAVE ON THE SPECIFIC PARAMETERS OF A GAS-RAMJET ENGINE

Novosibirsk AEROFIZICHESKIYE ISSLEDOVANIYA [Aerophysics Research, Collection of Works] in Russian No 5, 1975 pp 218-220

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.77 (résumé)]

[Text] Curves are given for the specific thrust parameters of a gas-ramjet engine (specific impulse J_{sp} and specific thrust R_{sp}) as functions of the characteristics of the air compression process when hydrogen is used as the fuel with excess air ratio $\alpha=1$. The graphs apply to the conventional region of flight altitudes for hypersonic aircraft (from $H \approx 20$ km when $M_H = 6$ to $H = 30$ km when $M = 12$). The graphs present four parameters characterizing the compression process: the degree of pressure increase P_2/P_H , the degree of compression $f_2 = F_2/F_H$ of the cross section of the jet of air passing through the air collector, the Mach number at the combustion chamber intake M_2 , and the coefficient of recovery of total pressure $\gamma = P_{02}/P_{0H}$. Here P_H and P_{0H}

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USSR

ZATOLOKA, V. V., ZVEGNITSEV, V. I. and SHUMSKIY, V. V., AEROFIZICHESKIYE ISSLEDOVANIYA, No 5, 1975 pp 218-220

are the static and ram pressure of the oncoming air, F_H is the cross sectional area of the air jet in the undisturbed flow encompassed by the air collector, P_2 and P_{02} are the static and ram pressure in the throat of the air collector, F_2 is the area of the air collector throat. Graphs are given for flight Mach numbers $M_H = 6, 8, 10$ and 12 .

2/2

GUTOV, B. I., ZATOLOKA, V. V. and KISEL', G. A.

TESTS OF A CONVERGENT INTAKE CONE AT AN ANGLE OF ATTACK OF $0-12^\circ$ AND MACH NUMBERS OF 8.4 AND 11

Novosibirsk AEROFIZICHESKIYE ISSLEDOVANIYA [Aerophysics Research, Collection of Works] in Russian No 5, 1975 pp 228-231

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.80 (résumé)]

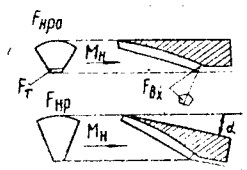
[Text] The paper gives the results of further experimental studies of a modified model 2A (cone channel 50 mm away). The research was done to determine the influence that increasing throat area F_r with increasing angle of attack has on expansion of the undetached range of angles of attack. In addition the authors determined the maximally attainable degree of compression of the cross section of the entrained jet F_{HP}/F_r in these tests (see the figure). The tests were done in the ITPM IT-301 pulsed hypersonic wind tunnel at Mach numbers of the oncoming flow of $M_H = 8.4$ and 11. The throat area was changed between experiments by changing inserts. Motion picture photographs were taken of flow around the model through the IAB-451

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USSR

GUTOV, B. I., ZATOLOKA, V. V. and KISEL', G. A., AEROFIZICHESKIYE ISSLEDOVANIYA, No 5, 1975 pp 228-231

schlieren-shadow instrument at a speed of about 500 frames per second. The N-105 loop oscilloscope was used to record the stagnation pressure in the burner cup $P\Phi(\tau)$ throughout the period of existence of flow in the tunnel. Figures 9.



2/2

USSR

UDC 629.7.036.54-64:536

GOLDAYEV, I. P., IL'INSKIY, V. V., NEFFA, YU. M. and KULALAYEV, V. V.

PARTICULARS OF THERMODYNAMIC CALCULATION OF A COMBUSTION CHAMBER ON A COMPUTER WITH CONSIDERATION OF IONIZATION OF THE WORKING FLUID

Khar'kov VOPROSY GAZOTERMODINAMIKI ENERGOUSTANOVOK [Problems of Thermal Gasdynamics of Power Plants, Collection of Works] in Russian No 2, 1975 pp 122-126

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.18 (résumé)]

[Text] An analysis is made of the peculiarities of computer calculation of the thermodynamics of a combustion chamber with consideration of ionization of the working fluid. The authors demonstrate the necessity for using artificial methods that consist in scaling of the energy conservation equation and determining the temperature designation in the combustion chamber within the limits of applicability of Newton's method to solution of the system of equations of the equilibrium state for an arbitrarily chosen initial solution. Scaling factors are found that appreciably reduce operating time. Figures 2, references 5.

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USSR

UDC 621.822.6

ZHIL'NIKOV, YE. P. and TOKMAK, L. T.

INVESTIGATION OF THREE-POINT CONTACT OF BALLS IN THE RADIAL THRUST BEARINGS OF GAS TURBINE AIRCRAFT ENGINES

TRUDY UFIMSKOGO AVIATSIONNOGO INSTITUTA [Works of Ufa Aviation Institute] in Russian, No 46, 1975 pp 17-22

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.41 (résumé)]

[Text] A procedure is outlined for calculating radial clearances to ensure two-point tangency of balls in a four-point bearing. A procedure and equipment are developed for experimental determination of the onset of three-point tangency of balls. Figures 3, references 5.

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USSR

UDC 621.822.6:531.43:621.543/4

BAKANOV, A. G. and TALANCHUK, P. A.

SOME RECOMMENDATIONS ON CHOOSING BEARINGS FOR LOW-POWER GAS TURBINE ENGINES

PROBLEMY TRENIYA I IZNASHIVANIYA. RESPUBLIKANSKIY MEZHVEDOMSTVENNYY NAUCHNO-TEKHNICHESKIY SBORNIK [Problems of Friction and Wear. Republic Interdepartmental Scientific and Technical Collection] in Russian No 8, 1975 pp 138-142

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.43 (résumé)]

[Text] The physical picture of the phenomenon of slipping wear of bearing rollers is generalized from a fixed ratio between shaft rpm and radial load. An examination is made of the theoretical effect of the radial working clearance on the position of the limit of normal operation of bearings, which is confirmed by experimental data. Generalized coordinates of the main graph are selected from which quantitative and qualitative methods can be developed to eliminate roller wear. Figures 2, references 4.

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USSR

UDC 629.7.036.3.357.22

SHPAKOVICH, N. I.

INVESTIGATION OF THE PROCESS OF ELECTRIC CHARGE TRANSFER IN THE FLOW PART OF A GAS TURBINE AIRCRAFT ENGINE UNDER STEADY-STATE AND TRANSIENT CONDITIONS

Kiev GAZODINAMIKA I KHARAKTERISTIKI AVIATSIONNYYKH DVIGATELEY [Gasdynamics and Characteristics of Aircraft Engines, Collection of Works] in Russian No 1, 1975 pp 23-31

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.52 (résumé)]

[Text] The paper gives the results of experiments on investigation of the formation of electric charge carriers in the flow section of a gas turbine engine. A description is given of an experimental installation that includes a gas turbine aircraft engine and monitoring and measurement instrumentation. Curves are given for the currents in the flow section during starting and under steady-state operation. It is concluded that charge carriers show up in conjunction with the fuel combustion process. Figures 5, references 4.

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USSR

UDC 629.7.036.3:533.647.2

KHIMICH, V. L. and POZOLOTIN, A. K.

INVESTIGATION OF A ROTARY MOISTURE SEPARATOR FOR THE AIR COLLECTORS OF GAS
TURBINE ENGINES

TRUDY UFIMSKOGO AVIATIONNOGO INSTITUTA [Works of Ufa Aviation Institute] in
Russian No 46, 1975 pp 48-52

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 6, 1976
Abstract No 6.35.54 (résumé)]

[Text] Experimental data are given on the effectiveness of operation of a rotary autogyrating moisture separator designed for installation in the air collectors of gas turbine engines. It is shown how operational and design factors influence the effectiveness of moisture removal, and also how the separator affects hydraulic losses and the uniformity of airflow at the engine intake. A comparative evaluation is made of rotary and static separators. Figures 4, references 3.

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USSR

UDC 538.4:621.362

KOSTENKO, P. P.

LOSSES IN THE CHANNEL OF A MAGNETOHYDRODYNAMIC INSTALLATION AND WORKING
EFFICIENCY AT DIFFERENT MACH NUMBERS

Khar'kov VOPROSY GAZOTERMODINAMIKI ENERGOUSTANOVOK [Problems of Thermal
Gasdynamics of Power Plants, Collection of Works] in Russian No 2, 1975
pp 127-132

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 6, 1976
Abstract No 6.34.132]

[Text] An examination is made of the influence that losses due to friction and heat transfer in an MHD installation (nozzle, channel, exit cone) have on its energy characteristics for different flowrates in the working channel. It is concluded that supersonic conditions not only ensure higher specific energy takeoff, but also provide efficiencies that are suitable even for small installations. Figures 3, references 9.

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USSR

UDC 533.6

IVANOV, M. YA., and KIMASOV, YU. I.

NUMERICAL SOLUTION OF THE DIRECT PROBLEM OF DETERMINING THE AVERAGED AXI-SYMMETRIC FLOW OF AN IDEAL GAS IN A TURBOMACHINE STAGE

UCHENYYE ZAPISKI TSENTRAL'NOGO AEROGIDRODINAMICHESKOGO INSTITUTA [Scientific Annals of the Central Aerohydrodynamics Institute] in Russian Vol 6, No 4, 1975 pp 12-20

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 1, 1976 Abstract No 1.34.37 (résumé)]

[Text] S. K. Godunov's finite-difference scheme of continuous computation is used to calculate steady and unsteady flows averaged with respect to the peripheral coordinate. The numerical approach that is used enables solution of the problem over a wide range of flowrates, including the region of transonic velocities. An examination is made of some particulars of gas flow in the intervane channel; in particular, the stability boundary of blower operation is numerically determined. The paper compares the results with experimental data and with calculations by other known methods of studying two-dimensional flow in turbomachines. Figures 4, references 16.

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USSR

UDC 621.45

KUTLYYEV, A. M., BONDAREVA, Z. D., KURBANOV, Z. D. and SBRUYEV, S. D.

USING INFORMATION ON AIRCRAFT GAS-TURBINE ENGINE PARAMETERS TO MAKE UP REQUISITIONS ON SPARE CONTROL ELEMENTS

Ufa ISPYTANIYE AVIATSIONNYKH DVIGATELEY [Aircraft Engine Testing, Collection of Works] in Russian No 2, 1974 pp 112-114

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 1, 1976 Abstract No 1.34.96 (résumé)]

[Text] An examination is made of a method of determining the theoretically necessary quantity of spare control elements for a gas-turbine engine test point. The proposed method is used to analyze distributions of the parameters of control elements before testing and after completion of regulation of the parameters of the selected type of engine. The results of the work could appreciably improve testing effectiveness.

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USSR

UDC: 534.322.3:51

GERSHMAN, S. G. and SVET, V. D.

AN EXPERIMENTAL STUDY OF SOME STATISTICAL CHARACTERISTICS OF AIRCRAFT ENGINE VIBRATIONS

AKUSTICHESKIY ZHURNAL in Russian Vol 21, No 5, 1975 pp 711-720

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 1, 1976 Abstract No 1.34.103 (résumé)]

[Text] Based on measurement of two-dimensional distribution laws and their parameters (lines of regressions, correlation ratios, etc.), as well as the spectral-correlation characteristics of vibrations of a turbojet engine housing it is shown that the different components of vibrations in separate sections of the spectrum are nonlinearly interrelated. Figures 9, references 12.

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USSR

UDC 621.515.001.5

GALERKIN, YU. B., Candidate of Technical Sciences, SELEZNEV, K. P., Doctor of Technical Sciences, Professor and CHERNYAVSKIY, L. K., Candidate of Technical Sciences

RESULTS OF AN AERODYNAMIC INVESTIGATION OF THE STAGE OF A CENTRIFUGAL COMPRESSOR WITH BUILT-IN INTERMEDIATE COOLERS

Leningrad ENERGOMASHINOSTROYENIYE in Russian No 2, 1976 pp 14-16

[Abstract] The authors cite the results of theoretical and experimental investigations of the specific elements of a centrifugal stage designed for a compressor with built-in coolers. They demonstrate the advantage of the examined compressor circuit over one with external coolers. They give recommendations on profiling and designing the specific elements. Figures 5; references 3: 3 Russian.

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USSR

UDC 621.515.001.5

SHKARBUL', S. N., AVDEYEV, N. P., Candidates of Technical Sciences,
ZHARKOVSKIY, A. A. and REZUNKOV, YU. A., Engineers

INVESTIGATION OF THE INFLUENCE OF BOUNDARY LAYER CONTROL IN CENTRIFUGAL WHEELS ON THEIR EFFECTIVENESS

Leningrad ENERGOMASHINOSTROYENIYE in Russian No 2, 1976 pp 16-18

[Abstract] The authors analyze the basic methods of boundary layer control in centrifugal wheels. On the basis of the experimental data they establish the strong influence of boundary layer suction on its state and on the effectiveness of the wheel. The effect obtained for a wheel with $L_2 = 45^\circ$ is 4-5% of the efficiency increase and 3-2.5% of the useful pressure. Figures 3; references 5: 4 Russian, 1 Western.

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USSR

UDC 621.165-226.001.5

TOPUNOV, A. M., Doctor of Technical Sciences, Professor

GENERALIZATION OF THE RESULTS OF EXPERIMENTAL INVESTIGATIONS ON DETERMINING THE EFFECTIVENESS OF USING ADDITIONAL BLADES IN STAGES OF STEAM TURBINES WITH SMALL D/L

Leningrad ENERGOMASHINOSTROYENIYE in Russian No 4, 1976 pp 6-8

[Abstract] The author generalizes the test results of stages with additional blades having small and large angles of flow emergence from the arrays and shapes of the flow parts that are characteristic of the last stages of stationary and maritime steam turbines. Figures 2; table 1; references 9: 9 Russian.

1/1

USSR

UDC 621.165-226.001.24

KUZYUSHIN, V. K., KRICHENOV, I. B., OSIPENKO, V. N., FILIPOVICH, A. N. and SHKLYAR, A. I., Engineers

COMPUTING THE PERMANENT BENDING STRAINS OF BLADES OF THE LAST STAGES OF POWERFUL STEAM TURBINES

Leningrad ENERGOMASHINOSTROYENIYE in Russian No 4, 1976 pp 8-10

[Abstract] The authors propose a method of determining the permanent bending strains of blades after various operations of mechanical treatment of their working parts on the basis of the equations found for the surfaces of the outer and inner profiles. Figures 2; references 6: 6 Russian.

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EQUIPMENT
Gyroscopic

USSR

UDC 531.17

LOYENKO, YU. M.

MOTION OF A GYROSCOPE WITH GENERALIZED PRECESSION OF ANGULAR VELOCITY

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 1, 76 pp 190-191
manuscript received 12 May 75

[Abstract] The restricted motion of a gyroscope with generalized precession of the angular velocity vector is considered. On the basis of the known condition of existence of such motions (Grioli condition) and by its direct integration the author obtains the conditions of existence of motions with generalized precession of the angular velocity in the form of a finite relationship between the Euler angles that are determined by the position of the body.

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USSR

UDC 534.014

GORDON, E.Ya., Nikolaev Computer Center

STABILITY OF PERIODIC SOLUTIONS TO THE EQUATIONS OF INCOMPLETELY SYMMETRIC
QUASILINEAR GYROSCOPE SYSTEMS AT CRITICAL FREQUENCIES

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 4, Apr 76 pp 111-116 manuscript
received 24 Jul 74

[Abstract] The object of this analysis is the stability of periodic solutions to the equations of incompletely symmetric quasilinear elastic gyroscope systems with either distributed or lumped parameters. The method of establishing the stability criteria is simplified here by letting the function which describes the motion of such a system satisfy a quasilinear fourth-order partial differential equation with appropriate boundary conditions. The solution is sought for each group of critical frequencies in the form of a power series with respect to a small parameter. Further approximations lead to a quasiperiodic function and the criteria for asymptotic stability. References 3: all Russian.

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USSR

UDC 531.01

GANIEV, R. F. and LYUTYI, A. I., Institute of Mechanics, Academy of Sciences UkrSSR, Kiev

STABILITY OF A GYROSCOPE WITH A SYNCHRONOUS-MOTOR DRIVE ON AN OSCILLATING BASE AT RESONANCE

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12, No 1, Jan 76 pp 82-89 manuscript received 14 Jan 75

[Abstract] A heavy symmetric gyroscope is considered, its outer gimbal rotating about the horizontal axis and the base oscillating in one linear and two angular modes. A synchronizing torque acts on the wheel, an unloading torque acts on the outer gimbal, and a viscous damping torque acts on the wheel bearings. The stability of the gyroscope under such conditions is enhanced by a sufficiently appreciable viscous damping and by an angular momentum close to a certain critical magnitude. The ranges of asymptotic stability in four different resonance modes are determined on the basis of the solution to the fundamental system equations, and the feasibility of avoiding instability altogether is established. In one case this is possible even without damping. Figures 4; references 6: all Russian.

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USSR

UDC 629.76.062.2

NAZAROV, B. I., and KHLEBNIKOV, G. A. Moscow in Russian Voenizdat 1975 216 pp, ill, 69 kop.

ROCKET GYROSTABILIZERS [Book]

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 178K]

[Abstract] The principles are presented of gyrostabilizers, which are widely used in various applications, including rocketry. Examples are given of gyrostabilizer design and construction. Their operating conditions and requirements in rocket technology are examined, and the typical errors and improvement of their dynamic properties are analyzed. The book is based on domestic [Soviet] and foreign open literature. It is intended for specialists engaged in the use and application of gyroscopes and control systems, and may be useful for students of military schools as well as civilian schools of higher education. Resume

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USSR

UDC 629.78.662.2

SARYCHEV, V. A., and MIRER, S. A. Institut prikladnoy matematiki AN SSSR [Institute of Applied Mathematics, Academy of Sciences, USSR] in Russian preprint No 123, Moscow, 1975, 66 pp, figs, 20 kop. Rotoprint

GRAVITATIONAL GYRO SYSTEMS FOR SATELLITE ORIENTATION (BOOK)

[From REFERATIVNYY ZHURNAL 41. RAKETOSTROYENIYE No 5, 76 Abstract No 5.41. 186K]

[Abstract] The dynamics are investigated of a gravity system with gyro damping for controlling the orientation of an artificial earth satellite. Within the framework of precession theory, equations of motion are derived for the system with an arbitrary number of gyros. One- and two-gyro designs are treated in detail. Conditions are obtained for system equilibrium in a circular earth orbit, and its stability is investigated. The satellite-gyro system parameters, which produce the maximum damping rate for natural oscillations, are determined quantitatively. A spin-stabilized satellite is examined in which a single-gimbal gyro is used to damp nutational oscillations. The optimal response parameters for this system are found analytically. Resume

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USSR

UDC 681.121.089.6

BALITSKIY, S. P., Northwestern Polytechnical Correspondence Institute

ADDITIONAL FUNCTIONAL POSSIBILITIES OF A GASOMETER INSTALLATION

Leningrad DOPOLNITEL'NYYE FUNKTSIONAL'NYYE VOZMOZHNOСТИ GAZOMERNOY USTANOVKI in Russian, 1975, 19 pp (manuscript deposited in TsNIITEIpriborostroyeniya 31 Oct 75, No. 444)

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.667DEP]

[Text] An examination is made of the problem of metrological precision of dynamic calibrations in instruments for measuring flowrate and pressure. The author mentions the objective difficulties due to lack of appropriate nomenclature for the respective calibration facilities. Prospects are substantiated for the idea of giving the gasometer installation simultaneously realizable qualities of static and dynamic calibrators of flowmeters and manometers. An investigation is made of a readout device for a gasometer installation in the form of a semiautomatic photoelectric relay system. The dynamic working mode of such a system is studied by the method of pulse-time diagrams. The results of the study show that a gasometer installation

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USSR

BALITSKIY, S. P., DOPOLNITEL'NYYE FUNKTSIONAL'NYYE VOZMOZHNOСТИ GAZOMERNOY USTANOVKI, 1975, 19 pp

with pneumatic relay module can be successfully used as a master generator of isolated pressure pulses of controllable duration. The peculiarities of such a generator include a broad range of control of pulse amplitude and duration, short rise time, and highly constant amplitude. A detailed description is given of the results of experimental studies showing that the pressure pulses formed at the output of the electromagnetic valve module have parameters closely approximated by square pulses. References 17.

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USSR

UDC 543.874.082

KARAS', N. N.

A FLASH POINT ANALYZER

NEFTYANAYA I GAZOVAYA PROMYSHLENNOST'. NAUCHNO-PROIZVODSTVENNY SBORNIK [The Petroleum and Gas Industry. Scientific-Production Collection] in Russian No 5(83), 1975 pp 49-51

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.875 by V. S. K.]

[Text] The paper gives descriptions and technical specifications on flash point analyzers for flowing petroleum products. The analyzers are made by the Bashkir Affiliate of the special design office of ANN [expansion not known]. The principle of operation of these instruments is based on automatic regulation and measurement of the temperature of the analyzed product as it continuously flows through a sensor on the level of the lowest temperature at which a mixture of vapors of the product and air above its surface flashes from an electric spark. All three analyzers are made up of a sample preparation module, a technological module and a control module. The sample preparation module is identical for all three analyzers, as is the technological

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USSR

KARAS', N. N., NEFTYANAYA I GAZOVAYA PROMYSHLENNOST'. NAUCHNO-PROIZVODSTVENNY SBORNIK, 1975 pp 49-51

module. The control module of the AVN-61 VZG analyzer is electromechanical in design, that of the AVN-63 VZG is pneumoelectric, and in the AVT-70 VZG4 analyzer the control module is electronic. The first two control module designs are not operationally reliable. The third -- electronic -- design is indeed more reliable, but use of the unit has revealed a number of shortcomings (complexity of construction, unstable operation of the DC amplifier, the need for frequent adjustment of the resistor and frequent cleaning of the thermocouple). An electronic control module based on the AVN-61 VZG analyzer that is free of these disadvantages has been developed at the Kherson Petroleum Refinery. Three years of production experience have shown that the module is highly reliable. The principal absolute error of the analyzer at a flash point below 59°C is $\pm 1^\circ\text{C}$, and above 50°C [sic] -- $\pm 2^\circ\text{C}$.

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USSR

UDC 621.372.812:389

CHEREMNYKH, M. A.

A SET OF ULTRAPRECISION LABORATORY EQUIPMENT FOR MEASURING THE COEFFICIENT OF REFLECTION AND STANDARD MEASURES IN WAVEGUIDES OF RECTANGULAR CROSS SECTION

Moscow NAUCHNYYE PRIBORY [Scientific Instruments, Collection of Works] in Russian No 7, 1975 pp 61-63

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.1044 by P. N. A.]

[Text] To maintain unity, regularity and high accuracy in measuring the VSWR of waveguide channels, the All-Union Scientific Research Institute of Physico-technical and Radiotechnical Measurements has developed and put into metrological practice laboratory instruments for measuring the coefficient of reflection (with respect to modulus) with high precision, and standard measures in rectangular waveguides for the frequency band of 2.6-37.5 GHz. The set of measures contains measures for nominal VSWR values of 2.0, 1.4, 1.14 and 1.05. The set of measures also includes a matched load with absorber VSWR of no more than 1.015 in the waveguide band. The measure for VSWR of 2.0 is certified with an error of no more than $\pm 1\%$ and has a frequency

1/2

USSR

CHEREMNYKH, M. A., NAUCHNYYE PRIBORY, No 7, 1975 pp 61-63

dependence of the VSWR in the waveguide band of no more than $\pm 2\%$. The measure for VSWR of 1.4 is certified with an error of no more than $\pm 0.8\%$ and has a frequency dependence in the waveguide band of no more than $\pm 1.5\%$. The measures with VSWR equal to 1.14 and 1.05 are certified with an error of no more than $\pm 0.6\%$, and also have a frequency dependence of no more than $\pm 1.5\%$. The tunable three-arm reflectometer method is used for measuring the coefficient of reflection with respect to modulus. The laboratory installations have a simple equipment makeup, fairly high productivity, and should be available to a number of enterprises and institutions. For measuring extremely small coefficients of reflection (down to 0.0005), a method and device have been developed without use of superhet amplifiers. The laboratory units can be used for measurements of reflections from flange joints, short waveguide sections and connectors between waveguide sections. References 6.

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USSR

UDC 681.2.087.92:65.011.56:531.781.2

PLATONOV, G. S., ALEKSANDROV, B. A., BORISOV, V. M. and KUZIN, YU. K.

A STRAIN-GAGE TRANSDUCER FOR AN AUTOMATED SYSTEM OF INFORMATION SUPPORT FOR STRENGTH TESTS

Khar'kov VSESOYUZNAYA KONFERENTSIYA 'AVTOMATIZATSIYA ISSLEDOVANIY NESUSHCHEY SPOSOBNOSTI I DLITEL'NOY PROCHNOSTI LETATEL'NYKH APPARATOV', 1975. TEZISY DOKLADOV [All-Union Conference on Automating Studies of the Carrying Capacity and Long-Term Strength of Flight Vehicles, 1975. Abstracts of the Papers] in Russian, 1975 pp 83-85

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKNIKA No 3, 1976 Abstract No 3.32.86]

[Text] The proposed strain-gage transducer is designed for use in automated systems for information gathering as a matching link between the primary data converter (strain gage) and the analog-digital converter of the digital system for collecting and processing data. The strain-gage measurement transducer solves the problem of linear conversion of changes in the resistance of strain-gage resistors to a standardized change in the pulse recurrence rate of square pulses over a broad frequency range. The proposed

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USSR

PLATONOV, G. S., ALEKSANDROV, B. A., BORISOV, V. M. and KUZIN, YU. K., VSESOYUZNAYA KONFERENTSIYA 'AVTOMATIZATSIYA ISSLEDOVANIY NESUSHCHEY SPOSOBNOSTI I DLITEL'NOY PROCHNOSTI LETATEL'NYKH APPARATOV', 1975. TEZISY DOKLADOV, 1975 pp 83-85

transducer provides high static and dynamic conversion characteristics combined with simplicity of design, which sets it above other devices with a similar purpose.

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USSR

UDC 531.717.2:621.833

SHVARTSBURG, L. E.

GEAR INSPECTION BY ELEMENTS

Moscow BESKONTAKTNYI KONTROL' RAZMEROV V STANKOSTROYENII [Noncontact Inspection of Dimensions in Machine-Tool Construction, Collection of Works] in Russian, "Mashinostroyeniye," 1975, pp 53-73

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.403 by P. N. A.]

[Text] A description is given of an instrument for element-by-element gear inspection. The device is based on a relative inspection method, and consists of two securely mounted extremum photovoltaic cells adjusted for the working surfaces of the teeth of the gear to be checked, an electronic converter and a registration device. Gear error is checked during continuous rotation. The instrument checks: the kinematic accuracy of the gears, smoothness of operation and lateral clearance of gear trains, such parameters as pitch deviation, engagement pitch deviation, accumulated pitch error, fluctuations in the length of the common normal, etc. Technical characteristics of the instrument: measurable modulus range 0.3-8 mm,

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USSR

SHVARTSBURG, L. E., BESKONTAKTNYI KONTROL' RAZMEROV V STANKOSTROYENII, "Mashinostroyeniye," 1975 pp 53-73

time for checking one gear 6-12 s, transmission ratio of the instrument 0.2 $\mu\text{m}/\text{mm}$, spindle speed 0.5-10 rpm, relative method of measurement, automatic measurement cycle, mean square error of measurement no more than 0.7 μm , overall measurements (without the stand) 1000 x 650 x 440 mm.

2/2

KIRENKOV, I. I., IZRAILOV, K. S. and DIYKOV, U. V.

METROLOGICAL PARTICULARS OF A GAS THERMOMETER THAT WORKS ON A TWO-RESERVOIR PRINCIPLE

TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII [Works of Metrological Institutes of the USSR. The All-Union Scientific Research Institute of Metrology] in Russian No 181(241), 1975 pp 6-14

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.960 (résumé)]

[Text] The paper describes a new method of combining the principal procedural and technical advances of gas thermometry in a single precision instrument. The technique enables determination of thermodynamic temperatures in a unified way based directly only on the triple point of water throughout the entire range in which gas can be used as the thermometric substance. Fundamental data are given from the theory on which the method is based, along with the parameters and a schematic diagram of a new gas thermometer with two working reservoirs, one with constant reference temperature, and the other for the temperature to be determined. An advantage 1/2

USSR

KIRENKOV, I. I., IZRAILOV, K. S. and DIYKOV, U. V., TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII, No 181(241), 1975 pp 6-14

of the method is reduction of the most considerable sources of error, including effects of gas sorption and condensation of impurities that might be present in the gas, which are not readily calculated. A more precise determination is made of the thermodynamic temperature at the boiling point of oxygen (90, 200+0.004K) that is the basic reference point of the IPTS-68 in the low-temperature region. Reference 1.

GRISHIN, A. F.

THE 'PROPAN-I' INSTALLATION FOR MONITORING THE GAS CONTAMINATION LEVEL AT GAS DISTRIBUTION POINTS

Moscow VSESOYUZNAYA KONFERENTSIYA 'SOSTOYANIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. SEKTSIYA 'PRIBORY DLYA ANALIZA VOZDUKHA NA TOKSICHESKIYE I VZRYVOOPASNYYE GAZY'. TEZISY DOKLADOV [All-Union Conference on the Current State and Outlook for Development of Analytical Instrument up to 1985, Tula, 1975. Section on Instruments to Analyze Air for Toxic and Explosive Gases. Abstracts of the papers] in Russian, 1975 pp 117-122

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.1139 by V. L. M.-B.]

[Text] The "Propan-I" system has been developed at the special design office of the "Gazavtomatika" All-Union Scientific Production Society for checking the level of gas contamination at gas distribution points. The equipment is used to monitor the propane-butane concentration at sensor installation points with provisions for connecting a meter readout at any

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USSR

GRISHIN, A. F., VSESOYUZNAYA KONFERENTSIYA 'SOSTOYANIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. SEKTSIYA 'PRIBORY DLYA ANALIZA VOZDUKHA NA TOKSICHESKIYE I VZRYVOOPASNYYE GAZY'. TEZISY DOKLADOV, 1975 pp 117-122

control point, automatic signal transmission when gas concentration reaches 0.4% butane-propane vapor mixture, and automatic alarm signal transmission to switch on lights, audible alarm and blowers when the limiting gas concentration of 0.8 vol.% is reached. The system has eight independent measurement and signal channels. The results of experimental operation of the device at the liquefied gas base of the "Soyuzgaz" Trust in Moscow showed reliable operation of the equipment. Measurement error is no more than 0.2 vol.%. Operating speed is not more than 40 s. Supply is from a 220 VAC line, and power consumption is 0.6 kW. Figures 3.

2/2

USSR

UDC 546.224.-31:543.258.082

CHERNIN, YA. M.

ON THE FEASIBILITY OF USING HYDROGEN SULFIDE COULOMETER CELLS AS A STANDARD

Moscow VSESOYUZNAYA KONFERENTSIYA 'SOSTOYANIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. SEKTSIYA 'METROLOGIYA I METROLOGICHESKOYE OBESPECHENIYE GAZOANALITICHESKIKH PRIBOROV'. TEZISY DOKLADOV [All-Union Conference on the Current State and Outlook for Development of Analytical Instrument Making up to 1985, Tula, 1975. Section on Metrology and Metrological Support for Gas-Analysis Instruments. Abstracts of the Papers] in Russian, 1975 pp 109-116

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.1157 by V. S. K.]

[Text] A report on zero-flow coulometer cells developed at the electro-chemical methods laboratory of the Experimental Design Office of Automation for measuring the concentration of sulfur dioxide in the air. The action of the cells is based on measurement of the current of electro-oxidation of the iodide ion formed in the measurement chamber due to the reaction of sulfur dioxide with iodine. The goal of the research was to study random and

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USSR

CHERNIN, YA. M., VSESOYUZNAYA KONFERENTSIYA 'SOSTOYENIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. SEKTSIYA 'METROLOGIYA I METROLOGICHESKOYE OBESPECHENIYE GAZOANALITICHESKIKH PRIBOROV'. TEZISY DOKLADOV, 1975 pp 109-116

systematic errors of measurement, and to obtain quantitative estimates of the measured quantities. The results of experimental studies showed that the systematic error does not exceed $\pm 0.21\%$, which means that the coulometer cell can be used as a standard in checking working instruments. References 8.

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BELUGIN, A. N., BONN, A. YA., DROBIZ, A. M. and KHACHATUROV, YU. G.

ON THE FEASIBILITY OF DEVELOPING A UNIVERSAL SIGNAL DEVICE FOR PRE-EXPLOSIVE CONCENTRATIONS

Moscow VSESOYUZNAYA KONFERENTSIYA 'SOSTOYANIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. SEKTSIYA 'PRIBORY DLYA ANALIZA VOZDUKHA NA TOKSICHESKIYE I VZRYVOOPASNYYE GAZY'. TEZISY DOKLADOV [All-Union Conference on the Current State and Outlook for Development of Analytical Instrument Making up to 1985, Tula, 1975. Section on Instruments to Analyze Air for Toxic and Explosive Gases. Abstracts of the Papers] in Russian, 1975 pp 56-64

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 1976 Abstract No 32.913 by V. L. M.-B.]

[Text] The development of reliable automatic methods of monitoring for pre-explosive concentrations of combustibles is one of the problems in the field of safety engineering and fire prevention measures. The currently used SVK thermochemical devices for signaling of explosive concentrations are not suitable for media that contain chlorinated organic compounds and certain

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USSR

BELUGIN, A. N., BONN, A. YA., DROBIZ, A. M. and KHACHATUROV, YU. G., VSE-SOYUZNAYA KONFERENTSIYA 'SOSTOYANIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. SEKTSIYA 'PRIBORY DLYA ANALIZA VOZDUKHA NA TOKSICHESKIYE I VZRYVOOPASNYYE GAZY'. TEZISY DOKLADOV, 1975 pp 56-64

other compounds that poison the catalytic elements of these instruments. Instruments that use flame-ionization detectors are insensitive to the presence of chlorine derivatives in the mixture being analyzed, are highly sensitive to the lower limits of explosiveness and are fast-acting. Experiments showed that a concentration from 0 to 5% of the lower limit of explosiveness is safe; concentrations from 5 to 50% present a limited hazard; concentrations above 50% are definitely dangerous. A flame-ionization detector should not produce a signal at concentrations below 5% of the lower limit of explosiveness, and must produce a signal at concentrations above 50%. The Experimental Design Office of Automation is currently developing a signal device with flame-ionization detector for pre-explosive concentrations from 5 to 45% of the lower limit of explosiveness, a delay time from 10 to 20 [sic], and capabilities for monitoring 68 substances. References 7.

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GRAFOV, K. V., KOVALEV, S. I., LOSITSKIY, I. T., MATSNEV, V. M., MELAMED, A. G., RYLOV, V. A. and SOROKIN, V. P.

AN UPDATED ANALYZER FOR TRACE IMPURITIES OF CARBON MONOXIDE AND DIOXIDE

Moscow VSESOYUZNAYA KONFERENTSIYA 'SOSTOYANIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. SEKTSIYA 'PRIBORY DLYA ANALIZA VOZDUKHA NA TOKSICHESKIYE I VZRYVOOPASNYYE GAZY'. TEZISY DOKLADOV [All-Union Conference on the Current State and Outlook for Development of Analytical Instrument Making up to 1985, Tula, 1975. Section on Instruments to Analyze Air for Toxic and Explosive Gases. Abstracts of the Papers] in Russian, 1975 pp 133-139

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No. 4, 1976 Abstract No 4.32.920 by V. L. M.-B.]

[Text] The paper presents electro-optical diagrams and design descriptions of the GIP10MB1, GIP10B2 and GIP10MB3A analyzers for carbon monoxide in a nitrogen-hydrogen mixture in ammonia production, carbon dioxide in converted gas in ammonia production, and carbon monoxide in the air of the work rooms. The infrared emission source is two nichrome coils heated by electric current.

1/2

USSR

GRAFOV, K. V., KOVALEV, S. I., LOSITSKIY, I. T., MATSNEV, V. M., MELAMED, A. G., RYLOV, V. A. and SOROKIN, V. P., VSESOYUZNAYA KONFERENTSIYA 'SOSTOYANIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. SEKTSIYA 'PRIBORY DLYA ANALIZA VOZDUKHA NA TOKSICHESKIYE I VZRYVOOPASNYYE GAZY'. TEZISY DOKLADOV, 1975 pp 133-139

Measurement range is from 0 to 0.005 vol.% of carbon monoxide and dioxide; measurement error $\pm 10\%$ of the measurement range. During operation, the zero of the analyzer is set once every three days. The analyzers have undergone State tests that confirm their excellent performance. Series production of the instruments is planned for 1976. Figure 1.

2/2

AVERIN, V. I., BACHERIKOV, V. V., BRYUKHNEVICH, G. I., VERNYY, A. YE.,
GORBENKO, B. Z., GUREYEV, B. A., STEPANOV, B. M. and TOLMACHEV, A. M.

REGISTRATION OF THE FINE TIME STRUCTURE OF RADIATION PULSES

Moscow VSESOYUZNAYA NAUCHNO-TEKHNICHESKAYA KONFERENTSIYA 'SOVREMENNAYA SOSTOYANIYE I PERSPEKTIVY VYSOKOSKOROSTNOY FOTOGRAFII I KINEMATOGRAFII I METROLOGII BYSTROPROTEKAYUSHCHIKH PROTSESSOV'. TEZISY DOKLADOV [All-Union Scientific and Technical Conference on the Current State and Outlook of High-Speed and Motion Picture Photography and Metrology of Rapid Processes. Abstracts of the Papers] in Russian, 1975 [page numbers not given]

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976
Abstract No 4.32. 1262]

[Text] In order to record the fine time structure of picosecond neodymium glass laser pulses, a photochronographic installation was developed based on the UMI-94M image-converter tube with electric field strength at the cathode increased to 10 kV/cm; a wide-band symmetric deflecting system with band of up to 3 GHz and wave impedance of 75 Ω . The pulses for electronic image scanning at $1-2 \cdot 10^{11}$ mm/s were produced by a symmetric cable generator with overall

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USSR

AVERIN, V. I., BACHERIKOV, V. V., BRYUKHNEVICH, G. I., VERNYY, A. YE.,
GORBENKO, B. Z., GUREYEV, B. A., STEPANOV, B. M., and TOLMACHEV, A. M.,
VSESOYUZNAYA NAUCHNO-TEKHNICHESKAYA KONFERENTSIYA 'SOVREMENNAYA SOSTOYANIYE I PERSPEKTIVY VYSOKOSKOROSTNOY FOTOGRAFII I KINEMATOGRAFII I METROLOGII BYSTROPROTEKAYUSHCHIKH SYA PROTSESSOV'. TEZISY DOKLADOV, 1975

voltage of about 20 kV, which was developed for the purpose. Polarity alternation in the output pulses was achieved by using charging voltages of alternating polarity. The commutating element was a high-speed discharger fired by the laser pulse.

2/2

HAUF, M., professor, engineer, Technical University, Prague

EXPERIENCES WITH THE EOK 2000 MADE BY CARL ZEISS STATE ENTERPRISE IN JENA,
IN CONNECTION WITH A REFINED TESTING PROCEDURE

East Berlin VERMESSUNGSTECHNIK in German Vol 24 No 5, May 76 pp 170-174 manu-
script received 30 Jul 75

[Abstract] A number of EOK 2000 distance-measuring instruments made by Carl Zeiss State Enterprise went to Czechoslovakia. Third-year engineering studies evaluated the instrument to establish its accuracy and speed when operated by relative beginners. The instrument was found to be accurate to within ± 7 mm on 924-2,840 m distances, and the relatively inexperienced operators obtained just as accurate results as the experienced ones. The instrument was judged as accurate as others such as the Geodimeter 6. Effects of battery voltage, additive constants, and periodic errors were discussed; they were not very great. Various means for refining the measurements were described: the difference

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EAST GERMANY / CZECHOSLOVAKIA

HAUF, VERMESSUNGSTECHNIK Vol 24 No 5, May 76 pp 170-174

method was used to eliminate the uncertainty in the determination of the additive constants (the effect of the uncertainty was greater than the effect of increasing the number of observations); a tiltable prism was fitted to increase the accuracy and measurement checking; another device to perform the same job with measurement of longer distances is still being modified; another device with an arm length of 62.5 cm is now being designed to eliminate the periodic error. Overall, the instrument performs satisfactorily, and such minor problems as exist involve the proximity range of distance measurements. Figures 5; tables 5; references 2: 1 German and 1 Czechoslovak.

2/2

EAST GERMANY

BOCK, D., graduate engineer, Chamber of Technology, Karl-Marx-Stadt

DISTANCE MEASUREMENT IN THE TTL TECHNIQUE

East Berlin FEINGERAETETECHNIK in German Vol 25 No 1, Jan 76 pp 16-19

[Abstract] The distance-measuring system described by the author in MASCHINEN-BAUTECHNIK Vol 22 No 5, 1973, pp 213-217 has been modified. The design, construction, operation, performance, and applications of the modified version, using the TTL [transistor-transistor logic] technique, was described and illustrated with photographs, drawings, block diagrams, and circuit diagrams. The new system, employing the digital-incremental principle with photoelectric scanning has a resolving power of 0.5 mm and a fast moving rate (up to 250 m/sec). All currently known electronic result-evaluation and -processing techniques (such as Ursalog) may be used in conjunction with the instrument. Figures 6; reference: 1 German.

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USSR

UDC 624.131.439.5.042.7

MASLOV, N. N., Doctor of Technical Sciences, and PLATONOV, A. V.

INFLUENCE OF SEISMIC EFFECTS ON THE SHEAR STRENGTH OF ROCK MASSES

Moscow GIDROTECHNICHESKOYE STROITEL'STVO No 5, 76 pp 24-28

[Abstract] A description and diagram are given of a special shock-loading shear-testing machine designed and built by the authors and A. V. LENYVICH. The results of their laboratory tests for a qualitative estimate of the influence of dynamic loading on the shear strength of a rock mass suggest that the most energetic frequency of the dynamic vibrations generated during earthquakes of up to 12-ball intensity, frequency of 1-10 Hz, lasting for 10-40 seconds (sometimes up to 3 minutes) in the majority of cases had no negative effect on the shear strength. Fatigue failure should not be expected until the dynamic loading has run through 60-100 thousand cycles.

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USSR

SOROCHKIN, B. M.

NEW PHOTOELECTRIC MEASURING CONVERTERS FOR MULTIRANGE SIZE SORTING

Moscow METROLOGIYA in Russian No 1, 1976 pp 37-43

[Abstract] The author describes the device and examines the metrological characteristics of new photoelectric measuring converters, models 76101, 76201, 76301, 76401. A practically linear static characteristic is realized in the converter with a discrete input signal concerning the number of the sorting group. Table 1; figures 3; references 4: 4 Russian.

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USSR

UDC 681.2.089.6-52:681.3:658.518.31

MSHCENKO, D. A., SOPOCHKIN, L.A., DOKSHIN, P. V., OFSHTEYN, B. M.
and IVANOV, V. N.

MACHINE METHODS OF ANALYZING AND MONITORING ERRORS IN THE MEASURING
SYSTEM OF THE M6000 CONTROL COMPLEX ASVT-M

Moscow METROLOGIYA in Russian No 3, 1976 pp 3-13

[Abstract] The authors are concerned with machine analyzing and monitoring methods and give the composition and basic technical parameters of the individual assembly modules appearing in the device for communicating with the M6000 ASVT. They demonstrate the most characteristic measurement channels which may be realized on the base of these modules. Tables 2; figures 2; references 3: 3 Russian.

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USSR

UDC 531.787.087.92:533.6.07

LAVROV, YU. V., KHABAROV, D. V. and CHEKRYGINA, N. A.

APPARATUS AND CONVERTERS OF PRESSURE FOR MEASURING PULSATIONS OF
PRESSURE IN SUBSONIC WIND TUNNELS

Moscow METROLOGIYA in Russian No 4, 1976 pp 35-38

[Abstract] The authors are concerned with measuring pulsations in pressure in subsonic wind tunnels. They examine two different schemes for measuring the pressure pulsations by investigating models of aircraft in wind tunnels distinguished by the construction of the inlet segment. In addition to studying the pressure pulsations the results of this work may also be used to study the boundary layer. Figure 1; reference 1: 1 Russian.

1/1

USSR

UDC 621.317.727.1:536.532

SACHENKO, A. A., KOCHAN, V. A. and BARANOV, YU. I.

A DEVICE FOR MEASURING THE OUTPUT SIGNALS FROM THERMOELECTRIC THERMOMETERS PP-1 IN THE RANGE OF 1100-1300° C WITH INCREASED ACCURACY

Moscow METROLOGIYA in Russian No 4, 1976 pp 50-54

[Abstract] The authors are concerned with a device for measuring output signals from thermoelectric thermometers. They describe the fundamental circuit of a potentiometer for monitoring the thermal emf of thermoelectric thermometers of PP-1 calibration in the range of 1100-1300° C under production conditions. In addition to decreasing the measurement error involved in thermal emf of the thermometers use of this device also allows the operator's working convenience to be raised and the time involved in making the measurements to be lowered. Figure 1; table 1; references 8: 8 Russian.

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USSR

UDC [621.317.374+621.317.335.3].029.6-97K4,2

BEYKIN, A. I., KOKSHAROV, A. M., GEPPE, A. P. and MIKHAYLOV, B. P.

SET-UP FOR INVESTIGATING DIELECTRIC LOSSES AND PERMEABILITY OF DIELECTRODES AT THE TEMPERATURE OF LIQUID HELIUM AT SUPERHIGH FREQUENCIES

Moscow METROLOGIYA in Russian No 6, 1976 pp 59-63

[Abstract] The authors describe a measuring set-up for investigating the dielectric losses and permeability of electroinsulation materials at the temperature of liquid helium at a frequency near 10 GHz. In the set-up they utilize a cylindrical resonator on a type H_{01n} wave prepared of brass coated with niobium. The quality of the resonator was computed according to the results of measuring the size of the damping time constant. To compute $\tan \delta$ and ϵ' of the dielectrics they use known formulas. As the measurements demonstrated, weak-polar dielectrics such as polyethylene and polytetrafluorethylene at a frequency near 10 GHz and a temperature of 4.2 K have $\tan \delta$ near $2 \cdot 10^{-6}$, and the polar dielectrics such as teflon-40 Sh have about $34 \cdot 10^{-6}$. Figure 1; table 1; references 4: 4 Russian.

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USSR

UDC 546.214:535.379.082

SUBBOTIN, V. P., BOZHEVOL'NOV, YE. A., RYLOV, V. A.

A CHEMILUMINESCENT METHOD OF DETERMINING TRACE CONCENTRATIONS OF OZONE IN AIR

Moscow VSESOYUZNAYA KONFERENTSIYA 'SOSTOYANIYE I PERSPEKTIVY RAZVITIYA ANALITICHESKOGO PRIBOROSTROYENIYA DO 1985 GODA', TULA, 1975. TEZISY DOKLADOV SEKTSII 'NAUCHNO-TEKHNICHESKIYE PROBLEMY GAZOANALITICHESKOGO PRIBOROSTROYENIYA' [All-Union Conference on the Current State and Outlook of Development of Analytical Instrument Making up to 1985, Tula, 1975. Abstracts of Papers in the Section on Scientific and Technical Problems of Gas-Analysis Instrument Making, Collection of Works] in Russian, 1975 pp 163-170

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.901 by V. L. M.-B.]

[Text] The paper gives a diagram and describes the design of a chemiluminescent gas analyzer of ozone in the air, in which the principle of action is based on photometric measurement of the light emitted as a result of interaction of the substance to be determined with a chemiluminescent indicator. Tests of a pilot model of the newly developed analyzer showed a detection limit of about 0.01 mg/m³. Signal output time is no more than 20 s. References 26.

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USSR

UDC 621.317.727.1(088.8)

ZARIPOV, M. F., DZHETERE, A. T., IL'YASOV, R. M. and FOKIN, A. N., Bashkir Affiliate of the Academy of Sciences USSR, Ufa Aviation Institute

A MULTIPLE-REVOLUTION AC NONCONTACT POTENTIOMETER OF TRANSFORMER TYPE

USSR AUTHOR'S CERTIFICATE No 459794, division G, filed 24 Dec 73, published 4 Apr 75

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.1057P]

[Text] This patent introduces a multiple-revolution AC noncontact potentiometer of transformer type. In order to improve working precision and reduce the nonlinearity of the static characteristic of the device, half the conductors of the measurement winding in the proposed potentiometer are led out through holes in the end rods of an E-type magnetic circuit, and are connected to the other half of the conductors of the measurement winding in series-aiding.

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USSR

UDC 621.385.833

BRYUKHNEVICH, G. I., LEONOV, R. K., STEPANOV, B. M., TAURIN, N. F. and YAMPOL'SKIY, P. A.

ON MEASURING THE PARAMETERS OF ABSORBING MICRONONHOMOGENEITIES IN TRANSPARENT MEDIA BY USING A PULSED ELECTRON-OPTICAL ULTRAMICROSCOPE WITH MAXIMUM SENSITIVITY

Moscow PROBLEMY FIZICHESKOY OPTIKI I METROLOGII [Problems of Physical Optics and Metrology, Collection of Works] in Russian, 1975 pp 25-31

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 2, 1976 Abstract No 2.32.1308]

[Text] An electron-optical ultramicroscope has been developed in which the illuminator is a pulsed laser, and the Tyndall cone is photographically recorded on film by a multiple-camera image converter with electronic shutter. An analysis is made of the principal metrological characteristics of such an ultramicroscope, and some results are given from applications to study of inclusions in optical glass. References 17.

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USSR

UDC 681.2/.3:621.317.39.087.92

BOLTYANSKIY, A. A., VASIN, N. N., SEKISOV, YU. N., SKOBELEV, O. P.

GROUPED MATCHING DEVICES FOR PARAMETRIC AND OSCILLATOR PICKUPS

Penza INFORMATSIONNO-IZMERITEL'NAYA TEKHNIKA [Information-Measurement Technology, Collection of Works] in Russian No 5, 1975 pp 50-55

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.85]

[Text] An examination is made of problems of constructing grouped matching devices based on the commutation method of the first derivative. In essence the method consists in converting the parameters of induction pickups or the low-level voltage of oscillator pickups to a pulse signal which is then amplitude-coded. Analysis of a model of the measurement circuit shows that use of the commutation method reduces energy consumption, and increases the speed, precision and sensitivity of the converter. The paper gives a schematic diagram of the grouped matching device as well as its principal technical characteristics. References 5.

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USSR

UDC 620.179.143

POLYAKOV, G. A., GUDZEV, A. P. and DUDKO, V. V.

AN EXPERIMENTAL MEASUREMENT INSTALLATION FOR MAGNETIC FLAW DETECTION ON PIPELINES

Ryazan' INFORMATSIONNO-IZMERITEL'NAYA TEKHNIKA [Information-Measurement Technology, Collection of Works] in Russian No 1, 1975 pp 207-211

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.200 (résumé)]

[Text] An investigation is made of a promising method of finding hidden defects -- magnetic flaw detection. A description is given of an experimental installation for studying the particulars of magnetic flaw detection on pipes buried under a layer of dirt, and results are given on research done with such an installation. References 3.

1/1

USSR

UDC 531.717.2:621.833.088

PELIKS, A. YA., SHVARTSBURG, L. E. and PANFILOV, S. A.

CHECKING ACCUMULATED GEAR PITCH ERROR

Moscow BESKONTAKTNY KONTROL' RAZMEROV V STANKOSTROYENII [Noncontact Inspection of Dimensions in Machine-Tool Construction, Collection of Works] in Russian, "Mashinostroyeniye," 1975 pp 41-52

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 3, 1976 Abstract No 3.32.404 by P. N. A.]

[Text] The paper presents the results of an investigation of a device for checking the circular pitch of gears by an absolute method with the use of an angle converter in the analog mode. The gear to be checked is driven by an electric motor through a speed reducer. The angle converter is set coaxially with the gear being measured. The signals from an extremum photovoltaic cell and the angle converter are sent to an electronic converter for information processing. The measurement results are recorded by a registration device. The unit for checking accumulated pitch error by an absolute method enables measurement with an error of no more than 0.7-0.8 μm where the variation of readings is 2.0-2.5 μm .

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ROTER, YU., and KORABLEV, I. V.

CONCERNING THE INFLUENCE THAT VARIATIONS IN SOME NONINFORMATIVE TEST PARAMETERS HAVE ON THE ACCURACY OF ABSORPTIOMETERS

Moscow AVTOMATIZATSIYA KHIMICHESKIKH PROIZVODSTV [Automation of Chemical Plants, Collection of Works] in Russian No 5, 1975 pp 3-11

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.882 by V. L. M.-B.]

[Text] The paper presents expressions for the mean square errors of differential nonequilibrium and equilibrium (compensation) measurement circuits, in particular for analytical absorption instruments, with consideration of two principal groups of interferences (intrinsic fluctuations of measurement circuits of a physical nature and technical instabilities of their parameters). In addition, the accuracy of absorption converters is influenced by noncontrollable parameters of the sample being analyzed (temperature, pressure, optical density, concentration of the component to be analyzed, etc.). An examination is made of block diagrams of differential nonequilibrium circuits and differential compensation measurement circuits, and possibilities of reducing errors of absorption converters are discussed. Fig. 2, ref. 6.
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IVANCHENKO, A. V., MALKOV, E. M. and PROSKURNIKOV, A. A.

AUTOMATIC DISPENSERS FOR VOLUMETRIC CHEMICAL ANALYSIS

TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYY NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII [Works of Metrological Institutes of the USSR. The All-Union Scientific Research Institute of Metrology] in Russian No 161(221), 1975 pp 159-161

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.717]

[Text] Miniature automatic burets types BA-1 and BA-2 have been developed for use as dispensers in titrimetric analysis with visual and instrumental methods of indicating the point of the end of titration. An examination is made of design particulars and the principle of action. The limiting relative error for liquid batching by the burets is no more than $\pm 0.2\%$. Standard deviation of batch volume is no more than 0.2% .

USSR

UDC 531.781.2.087-92.62-974

KOZLOV, I. A., LESHCHENKO, V. M., NOVIKOV, N. V., POTAPOVA, V. F. and BOGAY-CHUK, V. I.

MEASUREMENT OF DEFORMATIONS BY STRAIN-GAGE RESISTORS IN THE LOW-TEMPERATURE REGION

KOSMICHESKIYE ISSLEDOVANIYA NA UKRAINE. RESPUBLIKANSKIY MEZHVEDOMSTVENNIY SBORNIK [Space Research in the Ukraine. Republic Interdepartmental Collection] in Russian No 6, 1975 pp 82-92

[From REFERATIVNIY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.460]

[Text] An examination is made of problems of using series strain-gage resistors to measure deformations in the low-temperature region from +20 to -269°C. An estimate is made of the influence that low temperatures have on the coefficient of sensitivity of strain-gage resistors. An investigation is also made of the development of fictitious deformations and the possibilities of accounting for them. The stressed and strained state of tubular specimens of various materials is studied as they are cooled from +20 to -269°C. Figures 9, tables 2, references 3.

1/1

USSR

UDC 543.53:681.33.001.5

BAYBAKOV, S. N., IL'IN, V. A. and KULESH, V. YE.

SENSITIVITY OF NEUTRON ACTIVATION ANALYSIS OF PRODUCTS OF WEAR OF MACHINE COMPONENTS IN LUBRICANT

MASHINY I NEFTYANOYE OBOBUDOVANIYE. REFERATIVNIY NAUCHNO-TEKHNIЧЕСKIY SBORNIK [Machines and Petroleum Equipment. Scientific and Technical Abstract Collection] in Russian, 1975 pp 27-29

[From REFERATIVNIY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.887]

[Text] The paper describes a method of determining the sensitivity and registration threshold of a number of elements by using neutron activation analysis on an automatic installation consisting of a neutron generator, a pneumatic rabbit, a Ge(Li)-detector and a computer as applied to evaluating the corrosion wear of metallic and nonmetallic (in particular polymer) parts of machines. A table is presented that contains the thresholds of registration (in mg) for elements most frequently encountered in the products of wear of machine components and mechanisms, various kinds of seals, and gears. These tables can be used to study the antiwear properties of oils, the influence of additives on operating properties of oils, etc. Table 1, ref. 2.

1/1

USSR

UDC 389.64:543.812(047)

BANDZELADZE, A. YE., KOBYAKOV, I. F., PUSHKAREV, V. V., SUNTSOVA, G. F. and TYURIN, YU. N.

RESULTS OF COMPARATIVE TESTS OF SOVIET AND NON-SOVIET GRAIN MOISTURE METERS

TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VSESOYUZNYI NAUCHNO-ISSLEDOVATEL'SKIY INSTITUT METROLOGII [Works of Metrological Institutes of the USSR. The All-Union Scientific Research Institute of Metrology] in Russian No 161(221), 1975 pp 132-136

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.1049]

[Text] Based on analysis of metrological evaluation of Soviet and non-Soviet grain moisture meters, recommendations are made in the area of measuring the moisture content of grain and grain products. Tables 2, references 5.

1/1

USSR

UDC 54-44:543.712.082

CHEBOTAREV, B. F.

AN EXPRESS-WEIGHING METHOD OF MEASURING THE MOISTURE CONTENT OF A CATALYST

AVTOMATIZATSIYA I KONTROL'NO-IZMERITEL'NYE PRIBORY. REFERATIVNYY SBORNIK [Automation and Monitoring-Measurement Instrumentation. Abstract Collection] in Russian No 9, 1975 pp 20-22

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.1051 by V. L. M.-B.]

[Text] The paper describes an installation and procedure developed at the Grozno Affiliate of the "Neftekhimavtomat" Scientific Research and Design Institute for express-weight determination of the moisture content of spheroidal catalyst containing zeolites. Determination takes about 10 min, and the error is $\pm 0.5\%$. A table is given summarizing comparative data on the express and standard methods of measuring the moisture content of the catalyst, as well as the results of statistical processing. Figure 1, table 1, references 4.

1/1

USSR

UDC 532.137.082

SIMONYAN, A. A.

MEASURING THE VISCOSITY OF PLASTIC MATERIALS ON THE SV-1 INSTRUMENT

SBORNIK TRUDOV VSESOYUZNOGO ZAOCHNOGO POLITEKHNICHESKOGO INSTITUTA [Collected Works of the All-Union Polytechnical Correspondence Institute] in Russian No 91, 1974 pp 68-72

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 4, 1976 Abstract No 4.32.1073 by V. L. M.-B.]

[Text] The paper presents the results of experimental tests of the newly designed SV-1 viscosimeter for measuring the viscosity and strength limit of plastic materials. The instrument provides a shear surface of up to 100 cm² and eliminates the need for introducing corrections for friction arising between the parts of the device. The instrument was used under production conditions to determine the viscosity of materials in which viscosity varies as a function of temperature, moisture content and time (for instance greases, peat, cement mortar and so forth). Measurement error is from 2 to 5% depending on the nature of the material being tested. Measurement results can be used in research, academic and production work, and also for various engineering calculations. Figures 4, references 2.

1/1

USSR

UDC 629.7.036.3-226-752(088.8)

PALLEY, Z. S., TOYBER, M. L. and MOSKVIN, V. V., Riga Institute of Civil Aviation Engineers

A SYSTEM FOR NONCONTACT DETERMINATION OF THE AMPLITUDE OF VIBRATIONS OF TURBOMACHINE BLADES

USSR AUTHOR'S CERTIFICATE No 457000, division G filed 13 Dec 71, published 26 Feb 75

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 1, 1976 Abstract No 1.34.107P (résumé)]

[Text] This patent introduces a system for noncontact determination of the amplitude of turbomachine blade vibrations. To provide for digital recording of the amplitudes of blade vibrations in all stages, there is a subtracting counter connected to the counter of the number of measurements on one side, and by a shift pulse shaper to a shift register with stage indicator on the other side. The shift register is connected to a digital printer and to coincidence gates that are connected to the recording pulse shaper. Figure 1.

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USSR

UDC 629.7.036.3.001.4

POLATIDI, S. KH.

A METHOD OF ACCOUNTING FOR THE INFLUENCE THAT THE AERODYNAMICS OF TEST STANDS HAS ON MEASURED TURBOJET ENGINE THRUST

Ufa ISPYTANIYE AVIATSIONNYKH DVIGATELEY [Aircraft Engine Testing, Collection of Works] in Russian No 2, 1974 pp 35-43

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 1, 1976 Abstract No 1.34.102 (résumé)]

[Text] A method is proposed to account for the influence that the aerodynamics of the stands (design peculiarities of stands) have on measured parameters. The method is based on using a mathematical model of an engine. The technique appreciably simplifies the process of joining stands in measurement of turbojet engine thrust. Figures 3, tables 2, reference 1.

1/1

USSR

UDC 629.7.036.3:531.7

SIRAYEV, E. Z., TARKHOV, L. N. and ZORIN, V. A.

A CAPACITIVE SENSOR FOR MEASURING THE AMPLITUDES OF FLEXIBLE PIPELINE VIBRATIONS

TRUDY UFIMSKOGO AVIATSIONNOGO INSTITUTA [Works of Ufa Aviation Institute] in Russian No 46, 1975 pp 60-64

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.91]

[Text] A holder for a capacitive sensor is proposed that enables precise static graduation. A calibration curve is plotted by using the described device. This curve can be used for deciphering oscillograms of flexible pipeline vibrations. Figures 3.

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USSR

UDC: 536.46:538.4

BUTOVSKIY, L. S., ZHOLUDOV, YA. S., KARASIK, A. YE., KUZ'MENKO, V. I.,
LYUBCHIK, G. N., NEKHAMIN, M. M. and CHMEL', V. N.

DEVELOPMENT OF A STRAIGHT-FLOW COMBUSTION CHAMBER FOR AN MHD GENERATOR

Khar'kov VOPROSY GAZOTERMODINAMIKI ENERGOUSTANOVOK [Problems of Thermal
Gasdynamics of Power Plants, Collection of Works] in Russian No 2, 1975
pp 147-154

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 6, 1976
Abstract No 6.34.133]

[Text] The paper gives a description and the fundamental parameters of the
KS-2 combustion chamber for the K-1 MHD generator. The unit is designed for
a combustion product flowrate of 3 kg/s, dwell time of 20 ms, pressure of
0.3 NM/m², and oxidant enrichment of 50%. Characteristics are given on the
pneumatic atomizers used in the chamber for ionized additive spraying.
Figures 4, references 11.

1/1

USSR

UDC 621.438.001.5

OL'KHOVSKIY, G. G., Candidate of Technical Sciences

ANALYSIS OF THE OPERATING MODES OF THE GT-100-750-2 ENGINE USING
TEST DATA

Leningrad ENERGOMASHINOSTROYENIYE in Russian No 4, 1976 pp 16-18

[Abstract] The author derives analytical expressions which de-
scribe the operating modes of the basic elements of a gas turbine
engine and its power and efficiency as a function of the deter-
mining temperatures and indicators of turbomachines. He demon-
strates the methods of utilizing these expressions for solving
specific problems. Figures 3; tables 1; references 3: 3 Russian.

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USSR

UDC 626.833

PAK, P. N., Senior Scientific Associate, Central Asian Scientific Research Institute of Irrigation, and TYAN, G. A.

EXPERIENCE IN THE USE OF AXIAL PUMPS AT THE KUYUMAZARSKAYA PUMPING STATION

Moscow GIDROTEKHNIKA I MELIORATSIYA No 2, Feb 76 pp 52-55

[Abstract] Conditions are described regarding the reliability and service life of pumps OP10-185E and OP11-193E after ten years of operation. These pumps, with wheel diameters of 1,850 and 1,930 mm and driven by a 5,000-kw electric motor, can deliver 19 m³ second to a head of 17-20 meters. A description is given of necessary changes in materials used for the shafts and bushings in order to achieve satisfactory service life. Ill 4 Tab 1

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CSO: 1861

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